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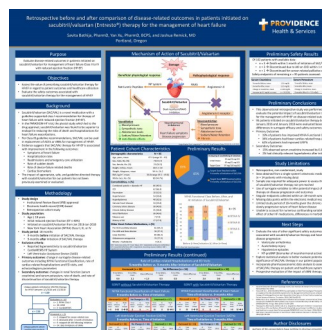
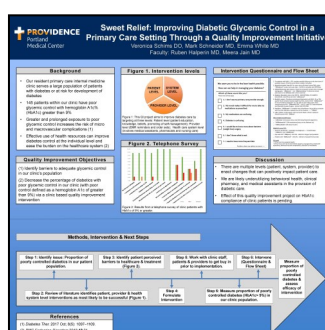
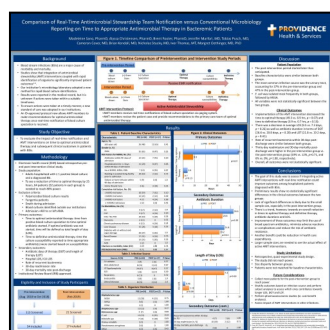
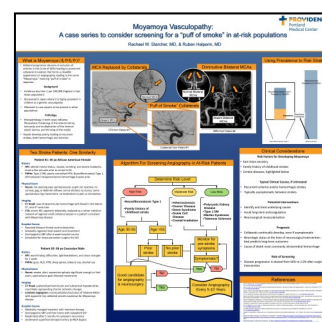
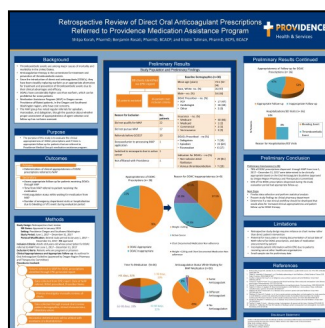
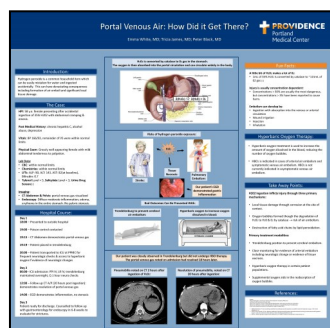
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1. A Case Of Multifactorial Orthostatic Hypotension Complicated By Chemotherapy Associated Autonomic Toxicity

Christopher Bender, MD, Amy Decket, MD

Introduction:

Autonomic neuropathy is known to occur as a side effect of some chemotherapy drugs, including cisplatin. This reports presents a patient with new onset of autonomic instability and orthostatic hypotension after receiving multiple rounds of cisplatin and gemcitabine chemotherapy.

Case Presentation:

An 81-year-old man with history of stage III lung cancer presented after a fall at home that occurred while getting out of bed in the middle of the night in the setting of recent malaise and poor oral fluid intake. His cancer was treated with surgical lobectomy and thoracic lymphadenectomy five months prior to his admission, and three rounds of chemotherapy with cisplatin and gemcitabine. He had been admitted to the same hospital three days prior for weakness and back pain and was empirically started on tamsulosin for urinary retention and was discharged with a foley catheter in place.

On presentation he was noted to have marked orthostatic hypotension, and during the first night of admission he had high blood pressures while sleeping, with systolic blood pressure greater than two hundred mmHg. Postural hypotension did not improve over the first twenty-four hours after multiple intravenous fluid boluses. He was managed by discontinuing exacerbating medications including tamsulosin and benadryl, as well as treatment with physical therapy, an abdominal binder, and minimizing the amount of time spent supine. He was discharged on the fifth day of hospitalization after clearance by physical therapy.

Discussion:

Although this case initially appeared to be a straightforward case of orthostatic hypotension related to hypovolemia, it became more complicated when the patient continued to display orthostatic hypotension after initial fluid resuscitation and discontinuation of associated medications. Further suggesting autonomic dysfunction was an inconsistent response of heart rate in relation to hypotension, as well as markedly elevated systolic blood pressure readings at night while the patient was supine. While not a common side effect, there are prior documented cases of autonomic neuropathy in association with cisplatin, which was determined to be the most likely etiology in this case, given the timeline of presentation. An additional factor complicating this case was the issue of addressing orthostatic hypotension in a patient with autonomic instability causing intermittent severe hypertension such that the use of midodrine was not an option. This required creative problem solving including the use of an abdominal binder and compression stockings in order to get the

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2. *Mixed Signals: A Case Of Hypothyroid-Induced Ogilvie's*

Brieanna Brown, MD, Paula Wichienkeur, MD

Ogilvie's syndrome, or acute colonic pseudo-obstruction (ACPO), is characterized by acute dilation of the colon, in the absence of a mechanical lesion, which obstructs the flow of intestinal contents. Pseudo-obstruction typically occurs in the critically ill, though the underlying pathophysiology is poorly understood and the etiology is often multifactorial. We present a case of a 51-year-old morbidly obese woman presenting with symptoms of severe hypothyroidism found to have massive acute colonic pseudo-obstruction.

Case presentation:

A 51-year-old African-American woman with BMI of 68, OSA, CHF, hypothyroidism and medication non-adherence presented with severe generalized weakness. On admission she was found to have TSH >150 and undetectable free T4. The patient was started on oral replacement therapy but despite this developed acute encephalopathy several days into the admission. She was evaluated for myxedema coma but lacked bradycardia, hypothermia and hyponatremia. Along with encephalopathy, she had poor oral intake and mild nausea, but no vomiting or abdominal pain, and continued having regular bowel movements. CT chest abdomen and pelvis was obtained in the work up of her encephalopathy, which revealed massive dilation of the cecum measuring 17 cm with no obvious mechanical obstruction concerning for pseudo-obstruction. GI and surgical services were consulted, and the patient was ultimately managed non-operatively with neostigmine given her comorbidities. Nasogastric and rectal tubes were placed for decompression and subsequent CT scans revealed decompression without perforation or re-obstruction. The patient was discharged several days later on thyroid replacement with normalization of her T4 and no evidence of re-obstruction.

Discussion:

Acute colonic pseudo-obstruction typically occurs in hospitalized patients in severe illness or after surgery and is hypothesized to be caused by an autonomic imbalance resulting in a hypotonic bowel. This mechanism was originally hypothesized by Ogilvie, who originally suggested lack of sympathetic signaling in the colon¹. Sympathetic excess rather than parasympathetic causes are felt to be the more likely etiology, as evidenced by ACPO being more prevalent in the critically ill with high sympathetic drive. Neostigmine, an acetylcholinesterase inhibitor and parasympathomimetic is commonly used to reverse pseudo-obstruction, further suggesting restoration of autonomic balance as a central pathophysiological mechanism. Neostigmine should be used with caution and often requires ICU monitoring given risk of precipitating bradycardia and bronchospasm. Case series of ACPO point to critical illness, surgery, electrolyte imbalance as the most common causes, but hypothyroidism is a rare cause of pseudo-obstruction. Hypothyroidism is a common condition and known to have several manifestations in the GI tract including esophageal dysmotility, delayed gastric emptying, and diminished colonic motility. This case represents the latter, which typically manifests as constipation, but instead presented as a life-threatening pseudo-obstruction which was masked by encephalopathy, body habitus, and lack of prominent abdominal physical examination findings. When conservative management fails, or the cecum exceeds 12cm, typically decompressive colonoscopy or surgery is warranted. In this case, given the patient's operative risk factors, chemical decompression with neostigmine was administered and the patient improved.

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3. *HIV-Associated Burkitt Lymphoma*

Rahwa Ghebremichael, MD, Amy Dechet, MD

A 24-year old woman with history of homelessness, HIV (off ART for 3 months, CD4 596 and 32%, HIV 55,800), chronic hepatitis C (untreated without cirrhosis) and active IVDU with heroin and methamphetamine presenting with 1 month of progressive fevers, chills, epigastric pain and nausea.

She was found to be tachycardic, tachypneic, febrile on admission with worsening anemia (Hgb 9, baseline 11) but otherwise normal labs. Exam was notable for new systolic heart murmur which prompted a TTE and empiric broad spectrum antibiotics for presumed endocarditis in the setting of her IVDU. To our surprise, the TTE revealed no vegetations and blood cultures were negative for growth. Fortunately, we had also ordered a CT abdomen pelvis at the time of admission which demonstrated diffuse gastric thickening with evidence of omental seeding with nodularity and splenomegaly. A gastric biopsy obtained the following day demonstrated DLBCL with FISH later revealing a high grade Burkitt lymphoma, EBV+. PET scan was notable for diffuse tumor burden. She was started on Short Course EPOCH-RR during her admission with a guarded prognosis, and concern for TLS and gastric perforation due to the extensive tumor burden in her abdomen. Thus far, she has tolerated 3 of the anticipated 4-6 chemo cycles with relatively minor complications by comparison including bradycardia, frequent NSVT and neutropenia necessitating adjustments to her chemotherapy regimen/schedule. Her substance use has remained an ongoing challenge.

Learning Points:

- HIV is associated with an increased risk for malignancies, lymphoid in particular, as compared to the general population
- Although the incidence of non-Hodgkin's lymphoma (NHL) in the setting of HIV infection has markedly decreased since the introduction of combination antiretroviral therapy (cART), HIV-NHL still remains a leading causes of AIDS-related deaths
- The most common subtypes of HIV associated NHL are diffuse large B-cell lymphomas (DLBCLs) and Burkett's lymphomas (BLs) and are associated with CD4 counts
- Burkitt's lymphoma (BL) is a highly proliferative NHL deriving from B cells and with characteristic oncogenic pathways, including translocation in the MYC gene.
- BL in HIV-positive patients constitutes 10-35% of AIDS defining lymphoma depending on the literature, as compared to 1-2% of NHL in the general population
- More than 2/3rd patients with AIDS-related lymphoma present with advanced lymphoma stage, B symptoms, extra nodal involvement and involvement of usual sites including soft tissue and body cavity.
- HIV positive patients with BL on CHOP like regimens respond poorly to this therapy. R-EPOCH might be an alternative treatment that offers better response in HIV associated-BL.
- It is important to include malignancy in the differential diagnosis of patients with HIV that present with subacute illness.

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4. The Dangers Of Gardening – Nocardia Infection In An Immunocompromised Patient

Gerald Hutfles, DO, Justin Jin, MD

Introduction:

Nocardia is a gram-positive, partially-acid fast, aerobic, branching bacillus that can be found in soil and water. It is typically an opportunistic pathogen, with most infections occurring in the immunocompromised. Disease can be localized or disseminated, preferring pulmonary, nervous, and cutaneous tissues. Optimal antimicrobial therapy depends on speciation of the isolate, as *Nocardia* may exhibit variable antimicrobial susceptibility. A high clinical suspicion and appropriate empiric antimicrobial therapy is necessary. This clinical case highlights the importance of these two factors, as well as the difficulties associated with treatment of disseminated Nocardiosis in the immunocompromised patient.

Case Presentation:

A 56-year-old Filipino-American male with a history of renal transplant in 2008 due to Membranoproliferative Glomerulonephritis on chronic immunosuppression presented with a three-month history of recurrent cough and chills, worsening in the past week. He had sought medical care twice during this period and had received full courses of Doxycycline and Amoxicillin-Clavulanate with intermittent improvement. He then presented hypoxic, febrile, and tachycardic to the emergency room, with a right upper lobe consolidation and right posterior axillary pain. Respiratory and blood were drawn, as well as Mycobacterium Tuberculosis sputum cultures given recent travel to the Philippines. Patient was then started on Ceftriaxone and Azithromycin for treatment of community-acquired pneumonia. He gradually improved over the next few days, but after several days, blood and sputum cultures were positive for what was found to be *Nocardia nova*. He also had right axillary and calf abscesses that were subsequently drained and growing *Nocardia nova*. MRI of his brain, CT of his abdomen, and transthoracic echocardiogram were performed to evaluate the extent of disease, and all were negative. He was transitioned to Imipenem and Trimethoprim-Sulfamethoxazole for treatment of disseminated Nocardiosis. While on therapy, he developed severe hyponatremia, which was thought to be due to current treatment. He was transitioned to Ceftriaxone based on available sensitivities and had improvement of his drug toxicities and symptoms on this regimen. After six weeks of IV antibiotics, he was transitioned to oral Cefpodoxime for an expected twelve months of therapy. Furthermore, nephrology discontinued his Azathioprine to reduce his immunosuppression, and his graft has continued to function well.

Discussion:

Nocardia is a ubiquitous organism that uncommonly becomes pathogenic to humans, but infections can be serious, especially in the immunocompromised. It is important to have a high clinical suspicion in immunocompromised patients. As more information emerges about this genus, it is important to fully speciate and obtain antimicrobial sensitivity patterns, which can be quite variable. Duration of treatment in immunocompromised patients and those with CNS infections is at least one year. There are no guidelines for primary prophylaxis for Nocardiosis. Some experts recommend indefinite secondary prophylaxis in patients with ongoing immunosuppression.

[Link to Poster](#)

5. When Less Virulent Becomes Virulent!! An Atypical Presentation Of Streptococcus Viridians

Samreen Kahn, MDDS, Stavan Patel, MS, MD

Introduction:

There are several cardiac and non-cardiac causes and risk factors for the development of infective endocarditis (IE) in young healthy adults. Some risk factors include prior IE, history of valvular or congenital heart disease, IV drug use, indwelling intravenous lines, immunosuppression, or a recent dental or surgical procedure. Most two common sites of IE are mitral and aortic valve. We present a case of a 45-year-old man with no-known risk factors, who presented with respiratory distress and was found to have streptococcal viridians (SV) endocarditis.

Case Presentation:

A healthy 45-year-old male presented with a four-day history of acute dyspnea and new-onset of fevers and chills for 24 hours before arrival. He denied any chest pain, dizziness, palpitations, LOC, weakness, increasing LE edema, or palpations. Patient denied any recent travels, prolonged non-ambulatory state, recent sick contacts, IV drug abuse, high risk sexual activities, no-known personal cardiac history, no recent dental manipulation. While in ED, he reported new onset of chest heaviness, and a non-productive cough. Vitals: T 37.2 C, BP 125/9, P 122, RR 26. EKG showed sinus tachycardia with non-specific ST&T wave abnormalities/No prior ECG where available to compare. Troponin 64 ng/L. ABG pH 7.230, PCO2 27.4 mmHg, PO2 82.1 mmHg. A-a gradient calculated to be greater than 200. CXR showed pulmonary vascular congestion. CTPA for PE was deferred as patient could not remain supine during examination secondary to worsening respiratory status. Patient was moved to medical ICU, with rapid worsening of respiratory status requiring intubation. Urgent bronchoscopy revealed diffuse alveolar hemorrhage consistent with severe acute respiratory distress syndrome (ARDS) with multifocal pneumonia. On initial presentation IE was not expected and patient was treated for viral and bacterial causes of ARDS. Echocardiogram showed aortic valve insufficiency with questionable vegetation with leaflet disruption. Subsequently blood cultures showed gram-positive cocci. Given the combination of aortic insufficiency (AI) and gram-positive cocci IE speculated which was soon followed by aortic valve replacement with intraoperative finding of aortic intra-annular abscess. Clinical course was complicated with cardiogenic shock and multi-organ failure. Blood cultures subsequently grew SV.

Case Discussion

Despite advances in medical, surgical and critical care interventions, IE remains a life-threatening illness. SV is not uncommon but are routinely seen in those with underlying heart disease and dental manipulation. SV is responsible for 40-60% of IE in normal valves [3, 4] and patients (young males and over 45 years of age) usually with mitral valves. It is commonly associated with heart failure and lesion such as peri-annular abscesses, fistulas, or pseudo-aneurysms with risk of mortality at 15% [1, 2]. Diagnosis may be difficult given no risk factors, non-specific symptoms but does not exclude this pathogen as a cause.

[Link to Poster](#)

6. *A Case Of Spontaneous Intercostal Artery Hemorrhage*

Chang Lee, MD, Veronica Schims, MD, Craig Riley, MD

Introduction: Spontaneous intercostal arterial bleeding is rare and usually related to trauma. We describe a patient with a history of cirrhosis and coagulopathy admitted with sepsis who spontaneously developed an expanding extrathoracic hematoma and subsequent hypovolemic shock requiring arterial embolization.

Case Presentation: 50-year-old male with a past medical history of alcoholic liver disease, esophageal varices, chronic coagulopathy, type 2 diabetes and hypertension on lisinopril was admitted to hospital with decreased urine output, dizziness, poor PO intake and lower abdominal discomfort. On exam, blood pressure was 80/50 mmHg and he was encephalopathic with otherwise unremarkable physical exam. Labs showed a normal lactate, sodium 117, hemoglobin 11 g/dL, INR 1.5, elevated creatinine and severe metabolic acidosis. CT abdomen and pelvis showed nonspecific diffuse colitis but no source of infection. His decompensated cirrhosis and acute kidney injury was thought due to poor oral intake and Lisinopril use. He developed worsening renal function and acidosis. His urinary output diminished leading to volume overload. He was then transferred to the intensive care unit for placement of right-sided internal jugular temporary dialysis catheter for initiation of hemodialysis, which was without complications. On hospital day five, he developed a precipitous drop in hemoglobin from 8.7 to 6.0 g/dL and a new right back pain with swelling. A CT abdomen/pelvis revealed a large hematoma along the posterior right hemithorax involving the latissimus dorsi extending from the level of the 1st to 10th rib measuring 30 cm x 5 cm. No reports of trauma and no invasive procedures occurred to explain the hematoma. The patient required multiple transfusions of red blood cells, platelets and fresh frozen plasma and the bleeding, expected to tamponade itself, continued. He underwent emergent arterial embolization with coiling of three intercostal arteries and then successful ultrasound-guided evacuation of the remaining large extrathoracic hematoma.

Discussion: This is a rare case of spontaneous intercostal arterial bleeding. Literature review shows spontaneous intercostal artery hemorrhage is rare. Cases of intercostal artery hemorrhage more commonly involve trauma, and rarer still, associations with neurofibromatosis type 1 and coarctation of the aorta. There is one case report of an incident occurring after hemodialysis, which is the case in this patient. Other case reports include patients with hepatocellular carcinoma, intercostal artery aneurysm while in flight, SLE with antiphospholipid syndrome, Dengue fever, as well as causes entirely unknown. Our patient had underlying liver disease with chronic coagulopathy and mild thrombocytopenia as risk factors for spontaneous bleeding, other considerations included use of low molecular weight heparin or heparin use with hemodialysis, but no inciting factor such as trauma or surgical intervention. When active, uncontrollable bleeding is observed from intercostal arteries, early arterial embolization should be considered.

7. Autoimmune Hemolytic Anemia In Chronic Lymphocytic Leukemia

Kelley Newton, MD, Janan Markee, MD

Patients with chronic lymphocytic leukemia have a 5-10% risk of developing autoimmune complications, the most common of which is autoimmune hemolytic anemia. Here we present a case of AIHA in a patient with suspected CLL that underscores several of the diagnostic and treatment challenges unique to this process.

A 79-year old man with a history of hypertension, atrial fibrillation, type 2 diabetes and hypothyroidism was undergoing workup for suspected CLL due to a persistent leukocytosis. He then presented to his primary care physician after several weeks of worsening exertional chest pain and dyspnea. On exam, he was noted to be confused as well as mildly jaundiced and was sent to the Emergency Department for work up with a specific concern for ACS given his presenting symptoms. Cardiac workup was unremarkable with a negative troponin, normal BNP and no changes on EKG. Pulmonary CTA was negative for pulmonary embolism. However, his lab work revealed an acute macrocytic anemia with a Hgb of 5.1 as well as a Total bilirubin of 4.1. Additional lab work revealed a significantly decreased haptoglobin, elevated reticulocyte count and IgG/complement positive DAT. CT abd/pelvis showed splenomegaly. The patient was admitted, placed on high dose steroids and 2 units of packed red blood cells were ordered. After some delay due to an inability to find compatible blood, he received several ABO and RhD matched units. After several days, his hemoglobin stabilized and reticulocyte count and Tbili down trended. He was discharged on high dose steroids to be tapered down once his Hgb>10 over the course of 4-6 months, with outpatient oncology follow up.

This case highlights several important points in the diagnosis and treatment of AIHA in CLL. Firstly, it is important to note that in virtually all cases of warm AIHA cross-matches will be incompatible as auto-antibodies will recognize blood group antigens and react to the vast majority of donor red cells. Consequently, ABO and RhD matched blood should be given in severe anemia requiring urgent blood transfusion. The blood should be given slowly with careful monitoring for transfusion reaction, though the risk of this is low. Another important consideration in the workup and treatment of AIHA is the substantial risk of VTE in these patients. Given the presentation of dyspnea in this patient, ruling out concomitant PE is especially crucial. Lastly, the relatively high rate of AIHA in CLL workup for hematologic malignancy should be considered in patients presenting with apparently idiopathic AIHA.

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8. *Wrap It Up – Sexually Transmitted Primary Cytomegalovirus Proctitis In Immunocompetent Host: A Case Report*

Vanessa Nwaokocha, MD, Brinton Clark, MD, Ronald Dworkin, MD

Background: In persons who presents with fever, rectal pain and bleeding, CMV proctitis should be considered if other workup is negative, especially if recent unprotected anal receptive intercourse.

Case Presentation: A 26-year-old bisexual man presented with chief complaints of fever, malaise, rectal pain, and rectal bleeding after anal insertion of foreign body. He initially denied any unprotected sexual intercourse. CBC, CMP, stool pathogen, rectal gonorrhea, and rectal chlamydia were unremarkable. He returned after 1 week with the similar complaints, however admitted to unprotected anal receptive intercourse a month prior. His vitals were notable for temperature of 102 with tachycardia to 108. Labs were significant for WBC 6.6, atypical lymphocytes 22%, ALP 173, AST 72, and ALT 146. CT AP with contrast showed perirectal fat stranding, rectal wall thickening, and several perirectal lymph nodes. Syphilis and HIV testing were negative. Given concern for viral proctitis from HSV, he was treated with valacyclovir. Flexible sigmoidoscopy showed diffuse severe inflammation with deep ulcerations consistent with severe ulcerative proctitis extending 15cm into the rectum. Biopsies were positive for CMV on immunohistochemical staining and viral culture. CMV serology was positive for IgM, IgG, and viral DNA. The patient was treated with ganciclovir for primary CMV proctitis for a 14-day course.

Conclusion: Proctitis typically presents with rectal bleeding, rectal pain, anorectal itching, cramps/tenesmus, or discharge from the anal canal. Common sexually transmitted infectious causes include chlamydia, gonorrhea, syphilis, HSV. CMV has also been shown to be a cause of proctocolitis in immunocompromised patients with HIV. Though rare, primary CMV in an immunocompetent host can cause proctitis and has been reported in persons who engage in unprotected anal intercourse, especially MSM.

Diagnosis of primary CMV proctitis requires multiple diagnostic tests in the right clinical setting. Detection of CMV IgM, a four-fold increase in CMV IgG done 2-4 weeks apart, and sigmoidoscopy showing rectal mucositis or ulceration are suggestive of CMV proctitis. In our patient, his atypical lymphocytes and elevated liver function tests were also suggestive of CMV. Biopsy showing presence of inclusion bodies or basophilic intranuclear inclusions and immunohistochemical staining that is positive for CMV are confirmatory.

Treatment for primary CMV proctitis has not been well defined and is typically conservative management though we chose to treat with ganciclovir given severity of symptoms. In conclusion, a mononucleosis-like illness with rectal bleeding and/or pain after unprotected anal intercourse can suggest a diagnosis of CMV proctitis.

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9. A Rare Case Of Metastatic Insulinoma In A Patient With Huntington's Disease

Olesya Petrenko, DO, Brinton Clark, MD, FACP

A 49-year-old female with past medical history of Huntington's disease presents to the ED after being found unresponsive at her assisted-living facility. She was noted to be hypoglycemic with a glucose of 21 and responded to dextrose. For the past several months, patient had symptoms of dizziness, tremors. She has no history of diabetes, and only home medication is Zyprexa. Patient required D10 drip to maintain glucose levels. Given patient's psychiatric history, there was concern for surreptitious use of diabetic medications. Labwork showed an insulin level of 163 and an elevated C-peptide of 7.0 consistent with endogenous insulin secretion. Patient underwent a 72-hour fasting protocol which revealed a glucose of 23, C-peptide of 4.1 and insulin of 101, undetectable beta-hydroxybutyrate levels and pro-insulin level of 782 (normal <8), which are consistent with a diagnosis of insulinoma. She was started on diazoxide, which diminishes insulin secretion, to treat the hypoglycemia. Patient underwent a pancreas CT protocol which showed multiple hypervascular hepatic masses up to 9 cm and one 4 cm mass in pancreatic tail concerning for metastasis. Pathology revealed metastatic well-differentiated neuroendocrine tumor grade 3. She was not a candidate for surgical resection of tumors and she was started on Octreotide 200 mcg TID. Patient underwent two Y90 therasphere radioembolization treatments, 2 months apart with improvement of hypoglycemia and discontinuation of diazoxide. Patient remains on Octreotide LAR injection every 4 weeks with frequent glucose monitoring.

Insulinoma, although rare, occurs in 1-4% of the population and is the most common type of functional neuroendocrine tumor of the pancreas. It secretes insulin which results in hyperinsulinemic hypoglycemia. Diagnosis involves persistent hypoglycemia with glucose <50 mg/dL, neuroglycopenic symptoms and prompt relief after glucose administration. Gold standard diagnosis is a 72-hour fast and measurement of plasma insulin, C-peptide and pro-insulin, which detects 99% of insulinomas. After lab confirmation, imaging is necessary to localize the tumor with either CT, MRI or EUS. Surgical resection is curative in most patients. Other treatment modalities include injection of octreotide, EUS-aided alcohol ablation, radio-frequency ablation or embolization of insulinoma, as well as targeted therapy with everolimus or sunitinib.

Malignant insulinomas are extremely rare and often invade into surrounding soft tissue or have lymph node or liver metastasis. They are usually unresectable and require targeted therapy.

We present the case of a 49-YO patient with Huntington's disease who presented with severe persistent hypoglycemia secondary to metastatic insulinoma. Diagnosis of insulinoma is often delayed or missed as symptoms may be attributed to psychiatric, cardiac or neurological disorders or medication misuse. Clinicians should be aware of insulinoma as a cause of life-threatening hypoglycemia.

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10. Soft Rock – When Blasting It Doesn't Work

Mark Schneider, MD, Jesse Powell, MD

Case-History of Present Illness: 68-year-old female presents with several days of malodorous urine and fevers. Brought to the ED by her daughter who diagnosed urinary tract infection (UTI) due to the distinct urine odor.

No hematuria, dysuria, retention, or incontinence.

Past Medical History: Recent hospitalization for UTI with culture that grew *P.mirabilis*, completed course of cefdinir, with follow-up culture ordered by PCP that grew extended-spectrum beta lactamase (ESBL) *E.coli*.

Physical Exam and Vital Signs: Vitals: 115/48, 101, 38°C, 18, 93% without supplemental oxygen.

- Lumbar spine tenderness, no CVA tenderness. Large area of erythema of right inner thigh and chronic lower extremity edema. Otherwise a non-focal exam.

Labs and Imaging: Procalcitonin 2.3, UA - packed bacteria/WBCs/3+ leukocyte esterase, WBC - 17.5, and urine culture with >100,000 CFU/mL ESBL *E.coli*. CT abdomen : Staghorn calculus within the lower pole calyces and renal pelvis of the right kidney. Heterogenous low density material within the mid and upper pole calyces suspicious for xanthogranulomatous deposits. Renal function evaluated via nuclear medicine kidney flow and function with diuretic showing: No urinary obstruction. Asymmetrical renal activity with 73% left kidney and 27% right kidney.

Clinical Course: IV antibiotics while undergoing work-up. Urology consulted and recommended stone removal due to recurrent UTIs with same organisms despite treatment. Went to OR for stone removal. Procedure abandoned due to unexpected finding of “white exudate renal collecting system mass” with concern for an organized abscess or fungal ball. Tissue sample sent for culture and pathology. Culture grew *Proteus mirabilis/penneri*. Pathology report stated degenerative amorphous material with rare inflammatory exudate and fibrinoid hemorrhagic exudate. Macroscopic appearance similar to picture at right. Patient readmitted for planned percutaneous nephrolithotomy. The stone was successfully removed by manual grasping and removal in pieces. Renal Matrix (Proteinaceous) Stones.

Rare: First described in 1908. 50 published cases between 1908-1981.

Risk Factors: Female. History of urinary tract infections, chronic renal failure, hemodialysis.

- Infection with *P.mirabilis* or *E.coli*. Proteinuria.

Presentation: Similar to those with calcium nephrolithiasis – flank pain and UTI.

Diagnosis: Possible to suspect/diagnose by imaging. Usually made at the time of surgery.

Treatment Surgery: Surgical removal is necessary – emergently if obstruction or urgently for source control when associated with a UTI. Percutaneous or uteroscopic approach – Shockwave lithotripsy does not work.

Prevention of recurrence: Prophylactic antibiotic use. Acidification of the urine.

Conclusions

- Rare and easily overlooked/mistaken for calcium based renal calculi
- Diagnosis often at the time of surgery
- Can cause obstruction and renal failure
- Surgical/urologic intervention is needed for removal. Refractory to shockwave lithotripsy.
- Antibiotics and/or acidification of the urine may help prevent recurrence.

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11.A Perplexing Case Of Episodic Abdominal Pain And The Role Of Mast Cells Gastroenteritis

Hayden Smith, MD, Mari Kai, MD

Here we present a case of chronic intractable vomiting and diarrhea of unknown cause, and introduce the relatively new entity of mast cell gastroenteritis.

Our patient is a 38-year old female with PMH of seronegative rheumatoid arthritis, mixed connective tissue disorder, and several recent hospitalizations over the past 4 months at outside hospitals for suspected colitis with associated vomiting and diarrhea. Current symptoms include 4 days of nausea with intractable vomiting, and 2 days of rectal fullness with mucoid rectal discharge. Previous workup at outside hospitals included multiple abdominal CT scans, flexible sigmoidoscopy, colonoscopy, and exploratory laparotomy. Prior to admission no definitive diagnosis were identified for her symptoms, despite extensive workup. Possible causes considered include inflammatory bowel disease, irritable bowel disease, hereditary angioedema, and small vessel vasculitis.

On admission, our physical exam showed no abnormalities including normal rectal exam. CT scan showed inflammation in the colon particularly in the rectum. A flexible sigmoidoscopy showed only edematous appearance of the colon without bleeding, ulcerations, or erythema. Biopsies were obtained, and initial pathology was non-specific. Special stains of the rectal tissue showed increased CD117+ cells at the lamina propria suggesting mast cell gastroenteritis (MCG) as the cause of her symptoms. She was treated with IV steroids until she could tolerate oral budesonide on discharge.

MCG is defined as the abundance of mast cells at the lamina propria along the GI tract. Release of inflammatory mediators by these cells cause gastrointestinal mucosal inflammation leading to symptoms of nausea, vomiting, diarrhea, and abdominal pain. The relatively new and evolving diagnosis of MCG can be part of a larger systemic process or as the patient's primary problem. Treatments include antihistamines, cromolyn, and steroids. Knowing when to test for MCG and how to interpret the results given a clinical scenario can be helpful in understanding the cause of a patient's symptoms. In the setting of this case we can better understand this clinical reasoning behind MCG and more effectively treat our patient and her underlying GI mastocytosis.

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12. A Case Of Gluten-Induced Delirium: Using Capsule Endoscopy To Diagnose Occult GI Bleeding

Rachael Starcher, MD, Lisa Sanders, MD

Introduction:

Despite an increasing prevalence of celiac disease worldwide, many patients remain undiagnosed, putting them at risk for late stage complications of unidentified and untreated celiac disease. Ulcerative jejunoileitis is a rare cause of occult GI bleeding seen only in refractory celiac disease or in atypical celiac disease at the time of diagnosis. When left untreated, ulcerative jejunoileitis can lead to bowel perforation, blood loss anemia, and T-cell lymphoma.

Case Presentation:

An 81-year-old male presented with hypoactive delirium of a few hours duration. His partner noticed inattentiveness, confusion, and inability to complete his daily activities the day of admission. Review of systems was otherwise negative. He had a previous stroke a year prior, sick sinus syndrome with a pacemaker, and myocardial infarction with stent placement just over 6 months before admission. On admission, he was tachycardic to 101, with normal blood pressure and mild anemia (hemoglobin 12.1 g/dL, from 14.1 g/dL a month prior). Infectious work up including viral panel, white count, procalcitonin, and urinalysis was negative. Creatinine was near the patient's baseline (1.2 mg/dL), but BUN was up to 82 mg/dL from 17 mg/dL a month prior. Head CT was negative for any new process.

Initial work up revealed positive fecal occult blood, but subsequent evaluation with upper endoscopy and colonoscopy found no cause. Hemoglobin trended downward and the patient received blood transfusions. Small bowel capsule endoscopy, however, showed evidence of ulcerative jejunoileitis, with subsequent duodenal pathology significant for gluten sensitive enteropathy (celiac disease), Marsh type 3 (destructive type). Serum studies showed elevated tissue transglutaminase IgA, anti-gliadin antibody IgG and IgA. He was started on a gluten free diet and has shown improvement in antibodies, stabilization of anemia, and significant improvement in mental status. Repeat capsule endoscopy has also shown improvement in jejunal ulceration.

Discussion:

Capsule endoscopy is an excellent diagnostic tool when the source of a GI bleed cannot be found with EGD or colonoscopy. Not only does it have greater than 96% positive predictive value for diagnosing celiac disease, it can also identify other small bowel disorders including Crohn's disease. This case highlights the importance of diagnosing celiac disease as when left untreated, complications such as ulcerative jejunoileitis can lead to bowel perforation, blood loss anemia, and T-cell lymphoma; however it can be effectively treated with a gluten free diet.

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13. *Vocal Cord Dysfunction Masquerading As Exercise-Induced Bronchoconstriction*

Brandon Tempte, DO, Meera Jain, MD, FACP, Jason Wells, MD

Intro:

Exercise-induced bronchoconstriction (EIB), previously exercise-induced asthma, has a high prevalence in the community. Patients with these symptoms are typically diagnosed clinically and treated empirically with pre-exercise albuterol. Eucapnic voluntary hyperventilation (EVH) has been used to objectively test for EIB and can help to confirm the diagnosis, as well as rule out other causes such as exercise-induced vocal cord dysfunction (EIVCD), which may mimic EIB.

Case Description:

A 42-year old female with no significant medical history, presented with dyspnea and chest tightness, starting 20-30 minutes into running exercise. Symptoms started five years ago. She was given an albuterol inhaler and later montelukast by her PCP, without improvement. She was referred to pulmonology and underwent EVH testing. Testing was negative for EIB. However, the inspiratory limb of her flow volume loop was flattened on post-exercise spirometry. She was subsequently referred to ENT for videolaryngoscopy (VLS) to rule out EIVCD. VLS showed paradoxical vocal cord function with rapid and forced breathing, and the diagnosis of EIVCD was made. Albuterol and montelukast were discontinued. She underwent outpatient speech language therapy with significant improvement in her symptoms.

Discussion:

EIB has a prevalence of 5-20% in the general population and may affect up to 90% of patients with symptomatic asthma. It typically presents as shortness of breath, chest tightness, and cough 10-15 minutes after initiation of exercise. In a community setting, EIB is typically diagnosed and treated based on symptoms alone. However, not all patients with these symptoms have EIB, and may fail expensive inhaler treatments. EVH can help to objectively confirm the diagnosis of EIB and help rule out other potential causes such as EIVCD.

EVH requires the patient to breathe at a high target minute ventilation to simulate exercise while breathing a set gas mixture to maintain eucapnia. Spirometry is then performed at 3, 5, 10, 15, and 20 minutes to evaluate for a decrease in post-exercise FEV1 >10%, indicating EIB. It is considered by many literature sources to be the “gold standard” of EIB diagnosis when compared to exercise testing and methacholine challenge.

Recent studies utilizing EVH have shown increasing evidence that EIVCD may be a more common cause of exercise-induced symptoms than previously thought. EIVCD can be suggested on EVH by flattening of the inspiratory flow volume loop on post-exercise spirometry. EIVCD can then be confirmed by video laryngoscopy (VLS). EIVCD is treated with speech language therapy, which is much different from EIB. Utilizing EVH to objectively diagnose EIB can likely lead to a decrease in inappropriate medication use and healthcare utilization with the added benefit of more accurate treatment modalities.

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14. *Be Careful What You Screen For: An Incidental Finding Of Tracheobronchial Amyloidosis*

Emma White, MD, Tricia James, MD, Vikram Sahni, MD, Jesse Powell, MD

Introduction: The 2011 National Lung Screening Trial (NLST) demonstrated a reduction in morbidity and mortality with LDCT compared to CXR. In 2013 the USPSTF began recommending CT scan for lung cancer screening in appropriate patients but, the 2015 National Health Interview Survey (NHIS) demonstrated that less than 5% of eligible patients received screening. The NLST also demonstrated a high rate of false positives, incidental findings, and the need for further invasive testing. When deciding to screen, patients and providers are tasked with reconciling these risks and benefits. In this case, we explore one patient's incidental findings, and the work-up that ensued.

Our Case: Our patient is a 70-year old female with PMHX of COPD (GOLD 1) who suffers from dyspnea with exertion, and cough. The patient did not tolerate LAMA therapy but her symptoms improved with the addition of an ICS/LABA inhaler. She has had 1-2 COPD exacerbations per year. She has a 54-pack year smoking history and quit smoking 2 years ago. In accordance with USPSTF guidelines and with shared decision making, the patient was referred for lung cancer screening with LDCT.

LDCT revealed thickening of the patient's right and mainstem bronchi, and trachea. In light of this, the patient was referred to pulmonology for bronchoscopy. Bronchoscopy demonstrated irregular thickening and heaped pink mucosa. Biopsies were examined by a pathologist who determined the tissue to be amyloid. Upon follow up in primary care clinic, the tissue samples were located and again sent for amyloid sub-typing which identified AL amyloid. With this finding, the patient required subsequent testing with free light chains, SPEP, and UPEP to rule out a plasma cell dyscrasia. Finally, a fat pad biopsy was ordered to evaluate for systemic amyloidosis. With all of these tests negative, the patient could be diagnosed with localized pulmonary AL amyloidosis & specifically tracheobronchial amyloidosis. This condition is managed symptomatically and does not require systemic chemotherapy.

Discussion: In this case, we explored the diagnosis of a patient with central airway obstruction due to amyloidosis found incidentally during lung cancer screening. In our patient, the incidental finding of central airway obstruction required further testing with bronchoscopy, pathology, mass spectrometry, SPEP, UPEP, serum free light chains, and a fat pad biopsy which were ultimately negative. The high rate of false positive screens and the need for subsequent testing are concerns physicians must address with their patients when recommending lung cancer screening CT. This should be balanced with the potential for reduced mortality and morbidity with CT screening, through higher cure rates, less invasive lung resection, and increased rates of smoking cessation.

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15. *Beck's Tetrad?*
Adding POCUS To The Clinical Exam For Pericardial Tamponade Improves Diagnostic Accuracy In Obstructive Shock

Cody Wiench, MD, Benjamin Pedroja, MD

Introduction:

Obstructive shock due to tamponade is an important, but rare, cause for sudden cardiovascular collapse. Accurate treatment requires prompt (and correct) diagnosis. Bedside echocardiogram can provide rapid and accurate diagnosis, however the physical exam can provide important clues to consider tamponade. In patients with conditions that predispose them to pericardial disease, such as SLE, one must have a high index of suspicion for tamponade when patients suddenly de-compensate.

Case Presentation:

A 27-year old woman with a history of SLE on chronic immunosuppression, pulmonary hypertension and chronic pain presents to the Emergency Department with subjective fevers to 40C, diaphoresis and sudden onset back pain. Vitals in the ED were impressive for heart rate of 106, blood pressure of 92/67, respiration rate of 10. Labs and imaging were unremarkable. Pt admitted to hospital for potential sepsis of unclear cause in an immunosuppressed patient and was started on vancomycin and piperacillin-tazobactam. On day 5 of hospitalization, a rapid response was called due to sudden onset of heart rate to 150, respiration rate to 24, blood pressures of 80s/50s and severe chest pain. Physical exam at that time was notable for muffled heart sounds and pulsus paradoxus. Bedside ultrasound demonstrated a large pericardial effusion resulting in cardiac tamponade. Emergent pericardial fluid drainage was preformed, draining 70 cc of fibrinous, bloody fluid. After procedure, the patient had rapid normalization of hemodynamics. Pericardial fluid analysis was performed, but nonspecific. It is thought that the effusion was secondary to SLE, and the patient was discharged to home in stable condition.

Discussion:

Cardiac involvement in SLE is thought to occur in more than 50% of SLE patients, however tamponade is much rarer with an estimated incidence of <1% in a review series. Tamponade portends a poor prognosis in SLE patients. During acute cardiovascular collapse in SLE, one must have a rapid approach to evaluating for tamponade. Pulsus paradoxus is one of those maneuvers; in one prospective study, it was found in 2/3 of patients with tamponade. Unfortunately, patients presenting with the classical "Beck's Triad" (hypotension, distended neck veins and distant heart sounds) is uncommon; in one study of ultrasound-confirmed tamponade, Beck's Triad was present in 0% of patients. Fortunately, there are key findings on POCUS exam that, in conjunction with the physical exam, can lead to rapid and accurate diagnosis of tamponade, for instance the absence of a dilated IVC can exclude tamponade with 97% sensitivity.

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16. Chronic Hepatitis B Reactivation: Deadly, But Preventable

Sarah Xie, DO, Andrea Roast, MD, FACP, Jesse Powell, MD

A 51-year-old Vietnamese male with chronic hepatitis B presents with symptoms of acute hepatitis. 2 months prior, his PCP had discontinued Tenofovir, for which he had been taking for the past decade, based on an undetectable viral load and a negative HBeAg. 1 month later, his viral load soared to 796 million so Tenofovir was restarted. On admission a few days later, the patient had scleral icterus and jaundiced skin. He had severe transaminitis, coagulopathy, and a total bilirubin of 7.7. His CT showed hepatitis, but no cirrhosis. With other etiologies ruled out, he was diagnosed with acute on chronic hepatitis B reactivation due to discontinuation of Tenofovir.

He was discharged once his LFTs improved though his total bilirubin continued to rise. The liver transplant team followed the patient post discharge and one month later, he represented with de-compensated liver cirrhosis which progressed to fulminant hepatic failure requiring a liver transplant.

An estimated 350 million people in the US live with chronic hepatitis B, though only a third are aware of their diagnosis. Untreated hep B accounts for over 600,000 deaths per year from HCC and end stage liver disease. There is no cure because hep B virus remains in hepatocytes by integrating its DNA into our own and by turning its DNA into stable mini-chromosomes. Tenofovir AF, the 1st line treatment, works only by inhibiting viral replication outside the nucleus, but does not eradicate viral DNA (point). A negative viral load, as seen in our patient, indicates only medication adherence and not a cure. Only 1% of patients achieve “seroclearance of HBsAg,” constituting a functional cure and can discontinue medications at that point, but 99% of patient require indefinite treatment. Our patient did not have labs consistent with a functional cure. Tenofovir has a black box warning that if discontinued, can cause hepatitis B reactivation leading to severe hepatic injury and even fulminant hepatic failure. It took only one month of discontinued Tenofovir to set in motion our patient’s path for a liver transplant. Fortunately, he is doing well now.

The take home points are that, unlike Hepatitis C, 99% of hep B patients require indefinite treatment to minimize the risk of premature death. Physicians should recognize that only seroclearance of HBsAg suggests a functional cure. Undetectable viral loads indicate successful treatment adherence.

Discontinuation of treatment can result in hepatitis B reactivation and even fulminant hepatic failure. From a broader perspective, clinicians need to be vigilant of undiagnosed chronic hepatitis B carriers, especially in patients immigrating from countries with high prevalence or patient with high risk behaviors. These patients are at risk for reactivation with any immunosuppressive therapy such as steroids or cancer therapies.

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17. ***Necrotizing Fasciitis - Time is of the Essence***

Ed Kim MD PGY 3 and Jeff Sun DO PGY 3

Necrotizing fasciitis (NF) is a life threatening rapidly progressive soft tissue infection that carries a high mortality rate. There are approximately 500-1,500 cases per year in the United States with a mortality rate of up to 18-20%. Without surgical intervention, the mortality rate is near 100%. NF can be characterized by tissue involvement, polymicrobial or monomicrobial etiology, or site of infection. The most common risk factor includes diabetes (reported in up to 60% of cases), IV drug use history, malnutrition, and chronic alcohol abuse. In about 50% of group A streptococcus cases, there is an associated streptococcal toxic shock syndrome with multiorgan system failure. Early recognition and prompt surgical intervention is key in improving mortality and amputation rates.

We present a case of a 64-year old male with history of severe malnutrition, chronic bilateral deep vein thromboses on apixaban, and chronic pancytopenia who presented with rapidly worsening right leg pain. He was afebrile on arrival with a blood pressure of 70/40 mmHg and heart rate of 90 bpm. Clinically he appeared cachectic and chronically ill with appreciable anasarca. His right lower extremity exhibited significant pitting edema with multiple hemorrhagic and flaccid bullae, areas of open weeping wounds with surrounding erythema, and severe tenderness to palpation. Initial labs showed leukopenia to 1.5k, thrombocytopenia to 107k, lactate of 3.2, procalcitonin of 152, and CRP of 21.9. 3-view X-ray of his right ankle showed diffuse soft tissue swelling without findings concerning for osteomyelitis or acute osseous abnormality. He had poor response to IV fluids and was found to be in septic shock. The physical exam findings and evidence of systemic involvement prompted a high suspicion for necrotizing fasciitis. He was started on broad spectrum antibiotics and eventually needed the support of multiple pressors. Urgent surgical consultation was obtained and transferred to a larger multispecialty hospital center. The patient hesitated about proceeding with surgery but ultimately decided to proceed after 24 hours when he then underwent debridement of his entire right leg. He ended up on three pressors and continuous renal replacement therapy for two weeks. He eventually needed a tracheostomy and transferred to a long term acute care facility only to be readmitted two weeks later for worsening infection. He was found to be bacteremic with streptococcus pneumoniae and underwent a right leg above-the-knee amputation. He ultimately succumbed to his infection and died approximately 3 weeks after readmission.

This case highlights the importance of both early clinical recognition and surgical intervention of necrotizing fasciitis due to its extremely high morbidity and mortality rate. Despite concerted efforts to get this patient into surgery, even a few hours of delay worsened the already poor prognosis. Especially as primary care physicians, prompt recognition and decisive action to get the patient appropriate care is crucial to improving overall outcomes.

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18. Project Nurture: A Model for Substance Use Disorder Treatment During and After Pregnancy

Roxanne Thomas MD PGY 3, John Yates MD PGY 2 , Rachel Jackson MD PGY 3,
Brenda Brischetto MD, Daniel Ruegg MD, Joshua Reagan MD

Addiction during pregnancy is an increasingly common problem for American women. Substance use during pregnancy can not only lead to pregnancy and childbirth complications, but also has enormous social costs that affect women, children and families in Portland and across the country. Project Nurture has provided a successful model for Substance Use Disorder treatment during pregnancy, combining Medication Assistance Treatment, prenatal care, drug and alcohol counseling, peer mentoring, and social services that improve outcomes for women suffering from addiction, as well as their children. Housed within a Family Medicine Residency, Project Nurture has also provided doctors in training with valuable experience caring for pregnant women and babies affected by Substance Use Disorders.

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19. Add Sweet's Syndrome to your dermatologic differential

Dr. Elizabeth Deyo, Dr. Mike Waddick

Context:

Sweet's Syndrome, an uncommon acute painful inflammatory rash, can be easily misdiagnosed. Early recognition and treatment can speed clinical recovery for patients with this difficult condition.

Objective:

Here we describe an interesting case report of Sweet's Syndrome in one of our patients in order to help providers remember this diagnosis on their dermatologic differential diagnosis.

Case report synopsis:

Our 44 year old male HIV positive patient with type 2 diabetes mellitus presents with arthralgias, chills, malaise and a plaque-like rash on the back of his neck, head and right wrist. Course: Lab work-up with blood culture, crp, cbc, cmp, HIV viral load, RPR, and biopsy were performed. The biopsy confirmed neutrophilic dermatosis consistent with Sweet's Syndrome. The patient was started on treatment after biopsy results returned. The patient had rapid improvement with treatment.

Treatment: Prednisone 30mg daily for 7 days, then tapered over 5 weeks.

Conclusion:

Sweet's Syndrome, an acute febrile neutrophilic dermatosis, is an uncommon inflammatory skin condition characterized by the abrupt onset of painful erythematous papules, plaques or nodules and systemic symptoms. The disease is classified into classical (idiopathic), malignancy-associated and drug-induced Sweet's Syndrome. While uncommon, primary care physicians should be familiar with the clinical presentation, diagnosis and initial management of this disease; and add it to their differential diagnosis when faced with acute painful rashes as described above. Key points include the diagnostic criteria, clinical appearance, and initial treatment of Sweet's Syndrome.

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20. The Dose Makes the Poison, or does it? Judicious Management of TCA Intoxication.

Sean Brachvogel, MD PGY1, MPH Resident; Justin Osborn, MD; Tanya Page, MD

Context/background:

Tricyclic antidepressants (TCAs) have been mostly supplanted by SSRIs in the treatment of depression, however they remain a mainstay of chronic pain management (Meloy). Untreated suicide attempts with a TCAs carry a 70% fatality rate, which drops dramatically to 3% with hospitalization (<https://emedicine.medscape.com/article/819204-overview#a6>). As such, maintaining healthcare provider recognition and management of TCA toxicity is of lifesaving importance.

Objective:

Here we describe a case report in which alcohol ingestion masked the severity of an accidental TCA overdose, and we reflect on a common diagnostic approach.

Case Report:

Our discussion begins with a 68-year-old Caucasian female with a history of COPD, diverticulitis, HLD, HTN, and chronic pain who presents with 80 minutes of altered mental status after consuming alcohol and her regularly prescribed amitriptyline. Her EKG demonstrated QRS widening and her serum alcohol level was 217. She was diagnosed with TCA overdose and alcohol intoxication and was treated with a sodium bicarbonate drip. Management of her TCA intoxication was clouded by a background of significant alcohol intoxication, and an amitriptyline and nortriptyline levels were collected to elucidate the severity of the TCA overdose. After eight hours of bicarbonate infusion her QRS narrowed and her condition stabilized.

Conclusions:

TCA therapy is common and TCA overdose is both especially dangerous and treatable. In our case collecting amitriptyline and nortriptyline levels did not aid in our diagnosis or treatment. We conclude that EKGs are the superlative diagnostic modality when evaluating suspected TCA overdoses.

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21. Death Files: a case of pancreatitis

Christelle Serra Van Brunt PGY3

Context/Background:

Case report of a 30yo male who presented to the ED with his second episode of pancreatitis after binge drinking over the weekend.

Objective:

Identify early prognosis markers and review common complications of pancreatitis

Case Report synopsis:

30yo male presented to the ER after acute onset of epigastric pain radiating to his back, nausea, vomiting. Patient reported binge drinking over the weekend but denied any drinks for the last 4 days. On presentation, patient had a lipase of 2600 and a CT abdomen with considerable edema surrounding the pancreas. Patient decompensated abruptly 6hours after presentation, developing lactic acidosis unresponsive to bicarbonate drip, and eventually renal failure, abdominal compartment syndrome, and finally fulminant liver failure leading to death despite heroic measures.

Conclusions:

Pancreatitis severity needs to be assessed at presentation. Current scoring systems are imperfect, using data over the first 48hours to assess severity. However clinicians can combine the APACHE II, or Ranson's criteria with imaging, CRP and clinical judgement to assess, triage appropriately, and treat severe pancreatitis cases.

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22. Miliary Tuberculosis: A Case Report

Jamie Skreen, DO PGY3 ; Tanya Page, MD

Context/background:

Miliary tuberculosis is a condition that is fatal if not diagnosed and can present in the outpatient setting with vague symptoms that resemble a viral illness, therefore, can be easily missed. Recognition of this disease as a differential is important in the primary care setting, especially when caring for immigrant and International patient populations.

Case Description:

A previously healthy 35 yo female from Vietnam whom presented initially to the ER for headache and fever for the past 2 weeks. She was diagnosed with acute viral syndrome given her symptoms, normal labs, and head CT, and discharged home. A few days later, she presented to an urgent care because she began having blurry vision, nausea, vomiting, lethargy and had incoherent speech. She did not have any URI symptoms, cough or hemoptysis. At the urgent care, she was noted to have some neck stiffness, fatigue, unsteady gait, and fever to 103F. They had her return to the emergency room for further workup. In the ED, she had an LP that revealed lymphocytic-predominant pleiocytosis, elevated protein, and low glucose. ID was consulted, from LP alone, differential included early viral meningitis vs bacterial (pyogenic vs AFB vs other atypical pathogens such as Listeria, Brucella, Syphilis) vs Cryptococcus. She was started on CTX, vancomycin, and acyclovir while workup was pending. She had a CXR to look for evidence of prior TB, which resulted in "diffuse pulmonary nodularity." Differential included respiratory bronchiolitis, miliary tuberculosis and other fungal infections, hypersensitivity pneumonitis and viral infection. After CXR, she was placed on airborne precautions and in a reverse flow room given possibility of TB. Because she had neurological symptoms, she received a brain MRI, which showed "small ring-enhancing lesions in the left frontal cortex and right frontal cortex." The following day, CSF result was positive for TB by PCR, confirming the diagnosis. Treatment with rifampin, isoniazid, pyrazinamide, ethambutol ("RIPE") was immediately started. Contacted by the county health department and they stated that even though there was a diagnosis, a sputum sample was needed to determine level of contagiousness. She was unable to produce sputum, even with induction (she had no cough), therefore she had bronchoalveolar lavage for sputum culture, resulted in 3+ (moderate) Mycobacterium tuberculosis. She continued the RIPE regimen and was discharged from the hospital the following day.

Discussion:

Although miliary TB is a rare form of TB (2% of TB cases), when missed it can be fatal, as mortality rate is between 15 to 30%. One of the main causes for high mortality includes late detection of disease caused by non-specific symptoms. Recognition of this disease as a differential is important in the primary care setting and when caring for international patient populations.

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23. Unpainfully Sweet

Khoi Nguyen, DO, Alex Schafir, MD

Introduction: Sweet's syndrome (ss), or acute febrile neutrophilic dermatosis, is characterized by sudden onset of fever, leukocytosis and erythematous plaques or nodules infiltrated by neutrophils. There are three main clinical settings in which Sweet's syndrome has been described: The diagnosis of Sweet's syndrome often has a temporal association with the discovery or relapse of cancer as reported in this case.

Case Report: A 64-year-old woman with recurrent breast cancer on targeted and hormonal therapy presented to the ED with acute onset of fever and diffuse non-tender body rash. Vitals suggested sepsis and she was treated with broad spectrum antibiotics. A chest xray, viral panel, blood cultures, echocardiogram and urinalysis were unrevealing. Erythrocyte sedimentation rate and C-reactive protein were elevated. There were 90% neutrophils. When her erythematous plaques became vesicular, she was treated with IV Acyclovir for possible disseminated zoster. This was discontinued when biopsy for HSV/HZV returned negative. Skin biopsy, however, showed dense neutrophilic infiltration consistent with Sweet Syndrome. Treatment with prednisone resulted in rapid clinical improvement.

Discussion: Historically, the diagnosis of SS requires the presence of painful erythematous lesions (both Major Criteria and two of four Minor Criteria). The absence of pain and tenderness in this patient made the diagnosis challenging. After extensive evaluation to rule out infectious etiology, it was revealed through skin biopsy that her syndrome was more consistent with Sweet Syndrome despite having non-tender lesions. Given her recent recurrence of breast cancer, it was thought that her SS was more consistent with Malignancy-Associated SS (MASS) subtype. MASS is most commonly associated with hematological malignancies such as AML, but also occurs coincident with solid tumors, such as carcinomas of GU organs, breast, and GI tract. In patients with a previous history of cancer, the diagnosis of SS usually heralds the onset of recurrence. Sweet syndrome may precede, follow, or appear concurrently with a malignancy. This patient was found to have a recurrence of breast cancer in the form of bone metastases two months prior to admission. In summary, this case demonstrates an atypical painless presentation of SS and how evaluation for malignancy is indicated for patients with SS, particularly when there is an absence of other explanations such as recent infection, inflammatory disease or drug exposure. Treatment : Prednisone 0.5mg to 1mg/kg per day. Symptoms usually improve within 48 hours and skin lesions resolves within 1 to 2 weeks. Steroid is then taper over course of 4 to 6 weeks.

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24. Struck By Lightning Twice

Bao-Ngoc Nguyen, MD, Emily Hitchcock, MD

INTRODUCTION: ANCA-associated vasculitides (AAV) refer to a group of disorders causing inflammation of small vessels which include granulomatosis with polyangiitis (GPA), microscopic polyangiitis (MPA), and eosinophilic granulomatosis with polyangiitis (EGPA, Churg-Strauss). Here I present a case of MPA vasculitis in a patient with alpha-1-antitrypsin (AAT) deficiency, and describe a proposed causal link between these two rare disease processes.

CASE REPORT: • 43-year-old man with history of newly-diagnosed AAT deficiency liver disease. • Chief complaint of subacute shortness of breath associated with hemoptysis and fever for 5 months. • Symptoms had been progressively worsening despite multiple courses of antibiotics and inhalers. • Pulmonary CT angiogram (CTPA) was negative for pulmonary embolism but showed “multifocal pulmonary infiltrates for which pneumonia and septic emboli could not be excluded”. • Infectious workup negative. • Positive myeloperoxidase (MPO) antibodies and findings on thoracoscopic lung biopsy most consistent with MPA. • Managed with steroids and rituximab.

DISCUSSION: • AAT is an acute-phase protein that inhibits the serine proteases of inflammatory cells, including proteinase 3 (PR3), to protect tissues from damage. • Mutations in the AAT-encoding gene SERPINA1 result in a structural change in AAT that inhibits its release into the bloodstream, leading to higher levels of proteases in the blood that can then cause excessive tissue damage. • Because increased levels of PR3 is a major component in the pathogenesis of ANCA vasculitis, a causal link between AAT deficiency and ANCA vasculitis has been proposed. There are many case reports describing this association, but the level of detail is variable based on the tests available at the time of the report. • Even though ANCA vasculitis is relatively rare, it is worth considering and pushed closer to the top of the differential list when a concurrent history of AAT deficiency is present.

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25. *Purpura Fulminans due to MSSA Toxic Shock Syndrome*

Leah Grant, MD, Rachel Plotinsky, MD

Introduction: Purpurafulminans is a rare and serious complication of an acute infectious process, characterized by large purpuric skin lesions, fever, hypotension, and DIC. The most common infectious cause of purpurafulminans is meningococcal disease, though few case reports in the literature describe *Staph aureus* as a causative organism.

Case Report: • A 53 year-old woman with a history of heart blocks/pacemaker placement in 2002 presented to the ED with nausea, vomiting, fevers, chills, diffuse muscle pain and asyncope. • She was found to have multi-organ dysfunction on labs, including AKI and thrombocytopenia. On hospital day 2, she developed acrocyanosis. She became febrile & hypotensive requiring transfer to the ICU for vasopressor support. Blood cultures were obtained. She was started on broad-spectrum antibiotic therapy. • Because of the patient's thrombocytopenia and overall critical illness, the differential diagnosis included TTP, DIC, HUS, drug-induced hemolytic anemia, or a rare disorder called catastrophic antiphospholipid antibody syndrome (CAPS). • She was treated empirically for CAPS with plasma exchange, heparin, and steroids. • Blood cultures were positive for methicillin-sensitive *Staph aureus*, and antibodies for CAPS were negative. • Antibiotic therapy was narrowed to Cefazolin, and her infected pacemaker was extracted. • She required bilateral below-the-knee amputations as well as multiple finger amputations due to necrosis. • Most likely diagnosis is purpurafulminans from MSSA toxic shock syndrome.

Discussion: • In acutely ill patients with skin findings described in this case as well as multi-organ dysfunction, there are several life-threatening diagnoses which must be recognized and treated promptly. • Given the 50% risk of mortality even with prompt initiation of therapy for CAPS, we did not delay in starting this patient on plasma exchange. • In purpura fulminans, the clotting cascade is disrupted by bacterial endotoxins and inflammatory cytokines, leading to a procoagulant and anticoagulant state, which in turn leads to intravascular thrombosis and hemorrhagic infarction of the skin. • A report of 5 cases of purpurafulminans caused by MSSA TSS was published in the journal *Clinical Infectious Diseases* in 2005, and the isolated strains of MSSA were noted to produce higher-than-expected levels of endotoxins normally associated with TSS. • Treatment of purpurafulminans from MSSA TSS is antibiotic therapy. • It remains a rare and serious complication of acute infection which providers should keep on their differential of life-threatening illnesses associated with thrombocytopenia and purpuric skin lesions.

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26. *Pulmonary Nocardiosis in an Immunocompetent Host*

Leah Grant, MD, Laura Loetscher, MD, Jennifer Marfori, MD

Introduction: • Nocardia is known to cause severe pulmonary or disseminated infection in immunocompromised patients, but can cause infection in immunocompetent patients. Providers should consider Nocardiosis in immunocompetent patients with prolonged and unexplained respiratory failure. • The preferred therapy for pulmonary Nocardiosis is a sulfa antibiotic for 3-6 months. Toxicity from prolonged use of alternative agents presents a therapeutic challenge in those with sulfa allergy.

Case Report: • An 85 year-old woman with a history of paroxysmal atrial fibrillation and heart failure with preserved EF presented to her primary care provider with 1 week of cough and progressive dyspnea. Chest x-ray (CXR) was normal, and echocardiogram demonstrated known HFpEF without new abnormalities. • Two months later, she presented to the hospital with progressive dyspnea, chest tightness, and was found to be hypoxic. CXR on admission showed bilateral consolidations as well as mediastinal and hilar adenopathy. She was treated with ceftriaxone & azithromycin for presumed community-acquired pneumonia (CAP). • Due to treatment failure, a CT Chest was obtained and showed a mass-like consolidation in the right middle lobe; she was discharged with a several-week prednisone taper for treatment of presumed cryptogenic organizing pneumonia. • Two weeks later, she returned for worsening dyspnea, chest pressure, malaise, and hypoxia. She was again treated for CAP and discharged. • One month later, she was admitted for similar symptoms, and a CT-guided lung biopsy showed several small clusters of long Gram-positive bacteria consistent with Nocardia spp. Tissue culture was positive for Nocardia cyriacigeorgica complex. • The patient was offered a challenge of her sulfa allergy (reported as a rash), but refused. She was started on linezolid in anticipation of a 6 month course of therapy. • Her hospitalization was complicated by cardiac & renal dysfunction. Due to severely impaired quality of life, the patient elected for hospice care and died approximately 2 weeks after discharge.

Discussion: • Nocardiosis most commonly presents as a pulmonary infection as inhalation is the primary route of exposure. • More than half of all reported Nocardiosis cases are associated with preexisting immunocompromise such as organ transplantation, AIDS, diabetes, chronic granulomatous disease and alcoholism. More recently published case reports depict Nocardia infections in immunocompetent patients with a prior history of lung disease, such as chronic obstructive pulmonary disease, allergic bronchopulmonary aspergillosis, and bronchiectasis. • Our patient was neither immunocompromised, nor had a prior history of lung disease, though was an elderly person. Immunosenescence is associated with decline in innate as well as T-cell immunity, which may have imparted risk to our patient. • The mainstay for treatment of Nocardia infections is trimethoprim-sulfamethoxazole (TMP-SMX). Alternative oral agents include minocycline, amoxicillin-clavulanate, and linezolid. • Had our patient not chosen the route of hospice care, close monitoring for linezolid toxicity would have been necessary with possible TMP-SMX re-challenge for long term therapy.

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27. *Not Just Kids—A case of Adult IgA Vasculitis*

Heidi Reich, MD, Jeff Youker, MD

INTRODUCTION: IgA vasculitis, formerly known as Henoch-Schönlein-Purpura, is generally recognized as the most common form of systemic vasculitis in children, with 90% of cases occurring in the pediatric age group. However, the remaining 10% are noted in adult populations, and often has poorer long term outcomes if not identified and treated quickly. IgAV is commonly associated with streptococcal infections, although additional triggers such as drug ingestions, insect bites, and vaccinations have been described. Symptoms can include palpable purpura, acute abdominal pain, arthralgias, and hematuria. Recognizing the constellation of signs and symptoms is key for expediting appropriate therapy, which may reduce long term renal damage.

CASE REPORT: A 27-year-old man with a history of asthma presented to the ED for maculopapular rash, polyarthralgias, and myopathy. □ Found to be hypertensive (160s/100s) and tachycardic (115) □ Creatinine 1.3, ESR 13, and CRP >80 □ History was significant for an upper respiratory illness 10 days prior, camping trip 5 days prior with ingestion of several drugs including cocaine, MDMA, marijuana and psychogenic mushrooms. He was admitted overnight for rheumatologic and infectious disease workup, but discharged the following day with plan for outpatient follow up. Two days later, he again presented to the ED with acute abdominal pain and nausea with multiple episodes of vomiting, and was readmitted. □ Persistently hypertensive (160s/100s) □ Worsened purpuric rash □ Nonpitting edema in upper and lower extremities □ Creatinine 1.2, normal CBC, ASO titer elevated (957) □ CT abdomen showed small bowel edema, and EGD/colonoscopy were inconclusive His collective symptoms were reviewed and included the following: □ Palpable purpura without thrombocytopenia or coagulopathy □ Arthralgias □ Abdominal pain IgAV was hypothesized and skin/renal biopsies were obtained. □ Skin biopsy: “leukocytoclastic vasculitis with granular IgA deposition in superficial vascular walls” □ Renal biopsy: “positive mesangial immunofluorescence for IgA” Based on these findings in conjunction with his symptoms and lab findings, he was started on a long steroid taper with plan for close outpatient follow-up.

DISCUSSION: IgA vasculitis can affect many organ systems including integumentary, GI, and renal. Although it is most common in children age 5-9, it can affect adults and requires prompt recognition to facilitate appropriate therapy. The classic tetrad of symptoms includes: □ Palpable purpura without thrombocytopenia and/or coagulopathy □ Arthralgias □ Abdominal pain □ Renal disease These symptoms often present in a predictable order, with purpura noted 4 days prior to other symptoms. Our patient required careful blood pressure management due to his renal involvement (started on ACEI), and steroids were initiated. At time of discharge, his renal function and rash were improving, and abdominal pain had resolved. Although full renal recovery is common in up to 89% of patients, long term renal impairment may occur. Close monitoring is imperative to minimize further renal damage.

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28. *Lemierre's Syndrome*

Jennifer Nguyen, MD, Tom Chau, MD

INTRODUCTION: Lemierre's syndrome is a rare and potentially fatal complication of acute pharyngitis most commonly seen in healthy, young adults who present with neck pain and persistent, high-grade fever. It is caused by anaerobic gram-negative organisms, most often *Fusobacterium necrophorum*, spreading into the deep spaces of the neck. This leads to septic thrombophlebitis of the internal jugular vein (IJ) with septic emboli, most frequently to the lungs.

CASE REPORT: A healthy 18-year-old woman presented to the hospital with five days of fever, rigors, sore throat, and left neck pain. She appeared relatively non-toxic but was febrile to 105.6°F and in septic shock. Her source of infection was initially unclear. Her work up included: • Normal CT neck with contrast and urinalysis. • CT abdomen and pelvis coincidentally showed multiple septic emboli within the lungs. • Blood cultures grew *F. necrophorum*. Re-evaluation of her admission neck CT revealed a modest filling defect in her left IJ. With her constellation of sore throat, left IJ thrombophlebitis, septic pulmonary emboli, and *F. necrophorum* bacteremia, her presentation was felt to represent Lemierre's syndrome. She was initially treated with piperacillin/tazobactam and then transitioned to IV penicillin G with rapid clinical improvement. She was discharged home to continue two more weeks of IV penicillin G followed by two weeks of oral amoxicillin/clavulanate.

DISCUSSION: What constitutes Lemierre's syndrome is controversial however the "classic" Lemierre's syndrome case consists of: • Healthy, young adult with pharyngitis. • Within 4-5 days, develops worsening neck pain, sore throat, high fevers, and rigors. • *F. necrophorum* bacteremia with jugular venous thrombophlebitis and disseminated septic emboli. • Most common sites for septic emboli include the lungs, joints, soft tissue, and abdomen. In retrospect, my patient's clinical presentation was typical for Lemierre's syndrome, even before her blood cultures resulted with *F. necrophorum*. Although a rare disease with an incidence of approximately one per million persons per year, there has been a resurgence of reported cases since the 1990's which some people hypothesize may in part be due to clinicians limiting the use of antibiotics to treat pharyngitis. Additionally, studies have found that *F. necrophorum* is a more common cause of acute pharyngitis than Group A *Streptococcus*. However, unlike Group A *Streptococcus*, *F. necrophorum* infections cannot be treated with macrolides and treatment often involves a prolonged course of penicillin antibiotic including parenteral therapy. As such, my patient's case demonstrates the importance for all internists to be aware of the classic symptoms of Lemierre's syndrome, a complication of acute pharyngitis, as delay in diagnosis and treatment could potentially result in fatal consequences.

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29. *Catastrophic Antiphospholipid Syndrome*

Gabriel Hocum, DO, Jeff Youker, MD

INTRODUCTION: Catastrophic Antiphospholipid Syndrome (CAPS) is a rare and extreme manifestation of Antiphospholipid Syndrome (APS) that features widespread thrombotic disease affecting multiple small vessels in a short time frame. CAPS affects only 0.8% of APS patients, but when it occurs it has a mortality rate of approximately 50%.

CASE REPORT: A 50 year old female with SLE and APS presented with 1 month of cough and fatigue and 2 days of severe confusion after missing doses of rivaroxaban. In the ED she was intubated for airway protection and transferred to the ICU. Her evaluation revealed multi-organ failure with extensive subacute brain infarcts, NSTEMI, severe heart failure, acute kidney injury, and acute on chronic anemia and thrombocytopenia. Her brain lesions were randomly distributed and could not be explained by a typical cardio embolic phenomenon or global hypo-perfusion. Lab work revealed decreased C3 and C4, and increased anticardiolipin and anti-B2-glycoprotein antibodies. She was diagnosed with probable CAPS based on clinical criteria, and treated with high dose steroids, anticoagulation and IVIG. Her acuity prevented histopathologic confirmation of small vessel occlusion. Despite some signs of clinical improvement and successful prevention of further thrombotic events, she had sustained extensive irreversible neurologic damage and was transitioned to comfort care.

DISCUSSION: Most of our understanding of this condition comes from retrospective analyses of patients in the “CAPS Registry”, which in 2016 included about 500 patients. It is more common in women, and the average age of onset is 38. 60% of these patients had an underlying primary diagnosis of APS; 30% had an associated SLE diagnosis; 65% of cases had an identifiable antecedent, most commonly, infection. Diagnostic Criteria: 1. Involvement of three or more organs, systems, and/or tissues 2. Development of manifestations simultaneously or in less than a week 3. Presence of antiphospholipid antibodies 4. Histopathologic evidence of small vessel occlusion in at least one organ or tissue Treatment: 1. Treatment of the inciting factor if one is identifiable (e.g. antibiotics for bacterial infection) 2. Anticoagulation, usually with heparin 3. High dose intravenous steroids 4. Plasma exchange and/or IVIG 5. Other considerations: cyclophosphamide, rituximab, eculizumab This case highlights the severity of the CAPS disease process, and the importance of early recognition and aggressive management. The primary prognostic factor for this patient, however, was not prompt diagnosis or treatment, but the extent of irreversible damage at the time of presentation.

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30. *Accidental Botulism Poisoning: A Case of Pickled Herring*

Garrett Spencer, MD, Greg Flick, MD

INTRODUCTION: Botulism is a rare cause of neuromuscular weakness that presents a diagnostic challenge in the face of respiratory collapse. Pupil and bulbar paralysis aid prompt recognition and treatment, as clinical confirmation can be time intensive and limited by sample integrity. Early treatment can halt paralysis and prevent ICU and ventilator days.

CASE DESCRIPTION: A 74-year-old male with hypertension and DVT presented with acute weakness and respiratory failure after three days of cough and diarrhea. Upon ICU admission for mechanical ventilation, we discovered sluggish pupils, mild ptosis, and proximal muscle weakness. Symptoms then progressed to unresponsive pupils, complete ptosis, and complete paralysis. While we suspected a neuromuscular cause, no single cause was identified despite extensive workup and neurology consultation. Our differential was narrowed after electromyogram (EMG) demonstrated a pre-synaptic defect, indicating either Lambert Eaton or Botulism as culprits. Empiric treatment with botulism anti-toxin resulted in clinical improvement of ptosis and proximal weakness. While ventilated, he wrote of recent pickled herring ingestion, possibly left unrefrigerated for a week. He ultimately received tracheostomy and transfer to long-term assisted care, and at discharge stool and serum testing for botulism toxin was still pending. While state-run testing finally returned negative, his illness was ultimately attributed to accidental botulism poisoning.

DATA:

Differential and Workup

Myasthenia Gravis • CT Chest: no mediastinal/thymic mass (thymoma) • Acetylcholine Receptor Ab: negative • Striated Muscle and Titin Ab: negative Lambert Eaton • Pre-synaptic defect on EMG: low motor amplitudes that increased with sustained exercise • Voltage Gated Calcium Channel Ab: negative • CT Chest: no nodules or masses (paraneoplastic SCLC in 50%) Demyelinating Polyneuropathy • LP: Glucose 76, protein 53, WBC 0, RBC 0, lymphocytes 67% • CSF: Ganglioside GM1 Ab negative Botulism • Stool: rejected, poor specimen quality • Serum: small sample size, Endopep-MS assay negative Central and Infectious • MRI brain and C-spine normal Infectious • Treponemal Ab negative • Lyme Ab negative

Botulism Key Features

Exam • Respiratory collapse • Proximal then distal paralysis, rapid progression • Preserved sensation, reflexes • Bulbar Paralysis with pupil involvement, nystagmus Workup • Botulism Neurotoxin (BoNT) of fluid, serum samples • Mouse Bioassay Treatment • Botulism equine anti-toxin, early administration can reduce ventilator and ICU days

RESULTS / DISCUSSION: Yearly US incidence of botulism is 100 cases, and early treatment with equine anti-toxin reduces mortality and ventilation time¹. Timely diagnosis is challenging as respiratory collapse overshadows subtle pupil and bulbar paralysis unique to botulism². Lab diagnosis with Endopep-MS assay is not FDA approved and can be falsely negative with small samples³ while verified sacrificial mouse bioassays are rarely used². Early suspicion should prompt anti-toxin treatment and discussion with the CDC's botulism consultation service, who will supply anti-toxin and provide assistance with workup in conjunction with state health laboratories.

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31. Ceftriaxone-Induced Immune Hemolytic Anemia from Treatment of Post–Treatment Lyme Disease Syndrome

Jillian Catral, MD, Emily Hitchcock, MD

INTRODUCTION: Drug-induced immune hemolytic anemia (DIIHA) is a rare though likely underreported entity that is associated with significant morbidity and mortality. • Ceftriaxone is a commonly used antibiotic with a well-documented association with DIIHA. The mechanism is a drug-dependent antibody, immune-complex mediated reaction which can be severe, leading to organ failure, shock, and even death. • While the majority of cases are in children, a recent literature review had one-third of cases being adults, with up to 30-40% mortality in all ages. • This case describes an adult patient treated for the controversial diagnosis of post-treatment Lyme disease syndrome (PTLDS) which resulted in ceftriaxone-induced immune hemolytic anemia (CIIHA).

CASE REPORT: The patient is a 72-year-old active female from Minnesota with self-reported history of disseminated Lyme disease and Babesiosis diagnosed in the 1980s, Graves' disease, hypertension, and fibromyalgia. • She presented with 3-4 weeks of progressive fatigue to being walker-dependent and mild cognitive impairment in setting of recently diagnosed normocytic anemia since starting 3x-weekly ceftriaxone-pulse therapy for PTLDS recommended by her PCP in California and prescribed by her local naturopathic doctor.

Evaluation: CBC: WBC 6.4, Hgb 9.4 (baseline ~14) with MCV 88, Plt 288 CMP: Total bilirubin 1.3 (from 1.8 two days prior to admission) Direct Coombs test: positive for IgG+ complement, IgG Peripheral smear: spherocytes, schistocytes

Haptoglobin:

LDH: 343

Reticulocyte index: 7.37 % retic: 16.7 Absolute retic count: 518

Ferritin 245, Fe 65 TIBC 408, %sat: 16

TSH 0.30, FT4 1.57

• Her ceftriaxone had already been discontinued 1 week prior to admission due to concern for DIIHA, which was consistent with her hospital workup. She was discharged home in fair but stable condition, and her anemia, energy, and cognition continued to improve in the weeks-months following.

DISCUSSION: This patient was determined to have a subacute immune-mediated hemolytic anemia with symptoms that correlated temporally with her ceftriaxone infusions. • DIIHA is a rare but potentially fatal entity with incidence of 1/1,000,000. Ceftriaxone (among other 2nd/3rd generation cephalosporins) and piperacillin, are commonly used antibiotics which have been associated with DIIHA. DIIHA has several mechanisms (see Figure 2). In the case of ceftriaxone, CIIHA is an immune complex-mediated reaction due to drug-dependent anti-ceftriaxone antibodies (acAb). • Other features found in CIIHA patients include acute renal failure, hepatitis, and DIC (see Figure 3). One study suggested an increased risk of CIIHA in patients with underlying conditions such as sickle cell disease and HIV, or previous exposure to ceftriaxone such as in this patient. • Treatment is withdrawing the offending drug and supportive measures as needed such as with blood transfusions. Some patients have been treated with plasmapheresis, corticosteroids, and IVIG. • 2016 Infectious Disease Society of America (IDSA) State Policy Primer on PTLDS: "The potential benefit of long-term use of antibiotics for the treatment of Lyme disease has been examined and found ineffective in multiple well-done clinical trials. ... Long-term antibiotic therapy can cause many serious health consequences including protracted and intractable diarrhea, severe colitis, antibiotic resistance, allergic reactions, bloodstream infections and clots from intravenous catheters, and even death, without any scientifically-founded prospect of benefit."

CONCLUSION: Early recognition of DIIHA (which can cause severe, sometimes fatal, reactions) and cessation of the causative agent is important to reduce the high morbidity and mortality associated with these patients. • The role of antibiotics in (and even the diagnosis of) PTLDS is contended. Potential for serious adverse effects such as DIIHA among others should be considered prior to initiating antibiotics for PTLDS.

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32. *Swimming Through Lake Placid: a Major Headache*

Elizabeth Severson, DO, Claudia Leonard, MD

Introduction: Leptospirosis is caused by *Leptospira* species, a spirochete bacterium that affects animals and humans. The disease can range from mild flu-like illness to multi-organ failure. While likely underreported, the incidence according to the World Health Organization can range from 0.1 to 10 per 100,000 depending on climate. Leptospirosis is commonly associated with occupational or recreational exposures.

Case Report: A 43 year-old previously healthy man presented with two weeks of myalgias, fevers, neck pain and throbbing headache. The patient competed in an Iron Man event in upstate New York one month prior to presentation. Initial investigation demonstrated a mild anemia, elevated aminotransferases and negative head CT. Lumbar puncture revealed a cerebrospinal fluid (CSF) pleocytosis, normal glucose, mildly elevated protein, and negative gram stain, consistent with aseptic meningitis. The patient was started on acyclovir. Given his recreational risk factor for Leptospirosis in the setting of characteristic clinical features, we added doxycycline on admission. Acyclovir was discontinued after negative HSV PCR. Within 24 hours, he improved significantly and was discharged with a course of doxycycline. Subsequently, all elements of the infectious evaluation returned negative except a positive Leptospirosis Ab. The patient's symptoms and transaminitis fully resolved.

Discussion: Leptospirosis is among the most common zoonotic infections worldwide, however in the United States only about 100-150 cases are reported annually, mostly in Hawaii and Puerto Rico. The organism infects humans through contact with urine of infected rodents, dogs, and livestock or urine-contaminated environments. Patients commonly present with: • Fevers, myalgias, and headaches after an incubation time of 2 to 26 days • Other findings can include cough, arthralgias, nausea and vomiting, abdominal pain, and rash • About 40% of people have elevated aminotransferases, and 50-85% have aseptic meningitis • Severe cases can progress to jaundice, renal failure, pulmonary hemorrhage, myocarditis, rhabdomyolysis, and ARDS. Leptospirosis is associated with a variety of risk factors, including occupational exposures and recreational activities. Large outbreaks are usually associated with recent rainfall or flooding. The bacteria can invade through skin abrasions and conjunctiva, or by swallowing contaminated water. The relationship between the risk of outdoor water sports and Leptospirosis infection is well described in the literature, with outbreaks around the world, including in Illinois (1998) and Florida (2005). Coincidentally, there had been significant recent rainfall with run-off into Lake Placid, the location of this patient's Iron Man competition. Our patient's CSF analysis was consistent with aseptic meningitis, but the time course was longer than expected for viral meningitis. Although rare in the United States, clinicians should consider leptospirosis in patients with aseptic meningitis, elevated aminotransferases, and potential exposure history.

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33. *Healthcare Leadership Academy: Resident And Faculty Interprofessional Training In Leadership, Population Health, and Patient Safety*

Samreen Kahn, MBBS, Victoria Costales, MD, MPH

Background:

In the era of accountable care, physicians are called upon to lead multidisciplinary teams for effective clinical practice and population health redesign. Physician leadership training programs are often siloed and rarely involve non-physician professionals. To address this gap, we developed the Healthcare Leadership Academy (HLA), an interprofessional leadership training for resident physicians and faculty. In this study, we present an evaluation of the first 3 HLA cohorts.

Methods:

A 10-item post-program survey was administered to all HLA participants, evaluating program satisfaction/value and components. To further assess the impact on graduate medical education, we conducted focus group interviews with resident physicians to gauge the value of the HLA training and gather lessons learned for future program enhancements.

Results:

In 2016-2018, 3 cohorts from various hospital departments participated in 15 HLA sessions, covering topics in leadership, management, population health, and patient safety. Culminating group work addressed a quality improvement project of significance to our patient population. Thirty of 50 participants completed the post-program survey (response rate: 60%). Most (97%) “strongly agreed” or “agreed” that the HLA had a positive impact on their personal and professional development. Five residents were interviewed. The themes that emerged included “learning from the ‘other’”, “quality improvement/working in a team”, “improved communication”, and “areas of improvement”.

Conclusion:

An interprofessional leadership training program addressing leadership, management, population health and patient safety is a valuable personal and professional development experience for residents, faculty, and hospital staff. Incorporating a population health project enriches team-based care while also promoting systems-based improvements that help promote better patient outcomes.

Public Health Implications:

Interprofessional leadership practice and education are essential as we advance the quadruple aim of improving the health of populations, enhancing patient experience, reducing cost, and improving the work-life of healthcare providers.

34. **Drugging Chemokine Receptors: Biased CXCR3 Agonists Differentially Regulate Chemotaxis And Inflammation**

Jeffrey Smith, MD, PhD, Additional Authors: Dylan Eiger, BS; Chia-Feng Tsai, PhD; Lowell Nicholson, MD; Rachel Glenn, BS; Priya Alagesan, BS; Amanda MacLeod, MD; John Jacobs, PhD; Tujin Shi, PhD; Sudarshan Rajagopal, MD, PhD

Introduction: G protein-coupled receptors (GPCRs) are the largest class of transmembrane receptors and the target of ~30% of FDA approved drugs. It is now well established that GPCRs can signal through multiple transducers, including classical heterotrimeric G proteins but also GPCR kinases and β -arrestins (1). While these signaling pathways can be activated or blocked by 'balanced' agonists or antagonists, they can also be selectively activated in 'biased' responses. This new GPCR signaling paradigm of 'biased signaling' heralds drugs with increasing efficacy and fewer side effects (2). With over 50 ligands and 20 receptors, biased agonism is prominent within the chemokine system. Here, ligands and receptors bind one another with significant redundancy. For example, the GPCR CXCR3 is expressed on activated T cells and has three established endogenous ligands: CXCL9, CXCL10, and CXCL11 (3,4). Despite its role in inflammation, infectious disease, and cancer (5), no approved drugs target CXCR3. The purpose of my research is to measure biased signaling at CXCR3 and assess the therapeutic potential of selectively targeting certain CXCR3 signaling pathways with biased agonists.

Methods: Utilizing state-of-the-art transcriptomic and phosphoproteomic analyses (6), we show vast differences in CXCR3-regulated intracellular signaling. Responses were compared between vehicle, CXCL9, CXCL10, or CXCL11 treatment assessing >5,000 unique phosphopeptides and >13,000 genes. Biased responses were assessed in both immortalized cell lines and primary human T cells. Utilizing various second messenger reporter systems and bioluminescence resonance energy transfer assays (2,3), we identify an important proximal GPCR signaling pathway, β -arrestin, and demonstrate that CXCL11 acts as a β -arrestin-biased agonist at CXCR3. Furthermore, we screened small molecules to identify a G protein-biased and a β -arrestin-biased small molecule agonist of CXCR3. We then utilized these small molecules to measure physiological readouts of inflammation and chemotaxis in both mice and patients.

Results: Endogenous chemokines of CXCR3 activate divergent intracellular signaling pathways. Using both chemokines and small molecules, we show that β -arrestin pathway signaling through CXCR3 is necessary for full efficacy chemotaxis of activated T cells in both mice and patients ($p < 0.05$). In addition, a β -arrestin-biased small molecule potentiated the cutaneous inflammatory responses in wild-type mice ($p < 0.05$), but not in either β -arrestin KO ($p = 0.77$) or CXCR3 KO ($p = 0.72$) mice, indicating both CXCR3 and β -arrestin dependence in T cell mediated inflammatory responses.

Conclusions: Here we show that CXCL9, CXCL10, and CXCL11 activate distinct CXCR3 intracellular signaling pathways with divergent physiological effects. We clearly demonstrate that the multiple CXCR3 chemokines, CXCL9, CXCL10, and CXCL11, are not redundant in their CXCR3 signaling properties. We show that non-canonical β -arrestin signaling is necessary for certain CXCR3-regulated inflammatory responses and for chemotaxis in both mice and patients. These data strongly suggest that CXCR3 biased agonists have therapeutic promise to treat inflammatory conditions.

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35. Is Empiric Coverage With Vancomycin Necessary For Pneumonia?

Hiromichi Park, DO, Shirin Ferdosian Najafabadi; Lian Wang PhD;
David Gilbert, MD, MACP

Introduction:

Currently Pneumonia accounts for 1.2 million hospitalizations every year with an estimated 63,000 deaths. Empiric Vancomycin therapy is often employed as empiric therapy versus Methicillin-resistant *Staphylococcus aureus* (MRSA). A nasal swab PCR is the current rapid screening test to detect MRSA. The FDA recently approved a sputum FilmArray pneumonia PCR panel that can detect MRSA, MSSA plus 17 other relevant bacteria, and 8 viral pathogens. The goal of this study was to compare MRSA detection by various methods.

Methods:

585 patients with Community Acquired Pneumonia (CAP) were enrolled to compare pathogen detection with a “bundle” of tests versus the new 33 target FilmArray sputum pneumonia panel. Of the 585 patients, 271 patients were evaluable for comparative detection of *S. aureus* via blood and sputum culture, sputum pneumonia panel and nasal swab PCR. Other detected pathogens were reported separately.

Results:

S. aureus was detected in 112 of 271 evaluable patients. The FilmArray pneumonia panel sampled from sputum detected 69 cases representing 62.2% of total evaluable cases. Nasal swab PCR detected 92 cases representing 82% of evaluable cases. P value was 0.004 between tests. When the nasopharyngeal swab PCR test was considered as the gold standard for MRSA, Sputum PCR had a sensitivity rate of 63.9% with a negative predictive value of 94.7%.

Species concordance (MSSA and MRSA) between *S. aureus* detected in nasal and sputum samples was 52/56 (92.3%) positive patients.

Discussion:

Nasal swab PCR testing had significantly higher sensitivity than sputum PCR in detection of *S. aureus* (both MSSA/MRSA). Of clinical import, a negative nasal PCR for MRSA supports discontinuation of empiric Vancomycin Therapy. Conversely, the lower frequency of MRSA detection with the sputum PCR creates uncertainty in decisions to discontinue Vancomycin therapy.

Conclusion:

Nasal PCR for *S. aureus* is more sensitive than sputum PCR for MSSA and MRSA. In a critically ill patient with influenza and elevated serum Procalcitonin level, it may be necessary to perform both a nasal *S. aureus* PCR (whether to discontinue empiric Vancomycin therapy) plus the sputum multiplex PCR for detection of other relevant bacterial pathogens.

36. Comparative Detection Of Airway MRSA In Patients With Community-Acquired Pneumonia (CAP)

Hiromichi Park, DO, Shirin Ferdosian Najafabadi, Lian Wang, PhD, David Gilbert, MD, MACP

Introduction:

Vancomycin is often included in the empiric therapy of CAP to ensure activity against MRSA. The current gold standard for detection of MRSA in the airway is a nasal swab PCR. The FilmArray sputum pneumonia panel includes PCR probes for MRSA. This study compares the detection performance of the nasal swab versus the sputum PCR detection of MRSA. Clinically, the absence of airway-detectable MRSA allows cessation of empiric Vancomycin.

Methods:

585 patients with Community Acquired Pneumonia (CAP) were enrolled to compare pathogen detection with a “bundle” of tests versus the new 33 target FilmArray sputum pneumonia panel. Of the 585 patients, 112 patients were evaluable for comparative detection of *S. aureus* via blood and sputum culture, sputum FilmArray pneumonia panel and nasal swab PCR.

Results:

The FilmArray pneumonia panel sampled from sputum detected 69 cases representing 62.2% of total evaluable cases. Nasal swab PCR detected 92 cases representing 82% of total cases. P value was 0.004 between tests. Sputum PCR had a sensitivity rate of 63.9% with a negative predictive value of 94.7% when nasal PCR was considered as the gold standard for MRSA detection. Conversely the nasal PCR had a sensitivity of 85.2% with negative predictive value of 98.3% when sputum PCR is gold standard. Among cases that were simultaneously detected by nasal and sputum PCR, species (MSSA and MRSA) match rate was 52/56 (92.3%).

Discussion:

Nasal swab PCR testing had significantly higher sensitivity than sputum PCR in detection of *S. aureus* (both MSSA and MRSA). Of clinical import, a negative nasal PCR for MRSA supports discontinuation of empiric Vancomycin Therapy. Conversely, the 20% lower frequency of MRSA detection with the sputum PCR creates uncertainty in decisions to discontinue Vancomycin therapy.

Conclusions:

Nasal PCR for *S. aureus* is more sensitive than sputum PCR for both MSSA and MRSA. In a critically ill patient with influenza and elevated serum Procalcitonin level, the most sensitive method to detect the presence of MRSA is a nasal swab PCR.

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37. Diabetes Education with a Teaching Kitchen Intervention Can Improve Hemoglobin A1c for Type 2 Diabetics Compared to Traditional Diabetes Education

Justin Ferley PGY2, Jill Christensen MD MPH, Heidi Davis MSW, Charlotte Navarre RN, Hsin-Fang Li PHD, Kathy Schwab MPH RDN, Richard O'Neil MBA

Purpose

The Providence Milwaukie Community Teaching Kitchen offers health-focused, budget friendly cooking classes for patients. In 2019, we piloted diabetes education classes with an added hands-on culinary session. This study compares the change in hemoglobin A1c for patients who participated in the pilot with those in the standard curriculum and those referred to diabetes education but did not enroll.

Methods

This retrospective analysis compared change in hemoglobin A1c for all patients referred to diabetes education in the Providence Northern Oregon region in 2019. Patients referred to diabetes education but not enrolled were considered a control group. To balance patient characteristics (e.g. age, gender, and pre-A1c score), two-to-one propensity score matching method was used to identify two matched controls for each enrollee. Change in hemoglobin A1c from baseline to 3-6 months were compared among matched comparison groups.

Results

13,582 patients were identified including 19 patients enrolled in diabetes education plus kitchen class, 640 patients in traditional diabetes education, and 12,923 patients referred but did not enroll. After matching, 1,318 matched patients were selected from the non-enrollees as the control group. The change in hemoglobin A1c was -0.49, -0.81, and -0.95 for the control group, diabetes education group, and diabetes education group with kitchen classes, respectively. Compared to the control group, both diabetes education groups had a greater reduction in hemoglobin A1c (difference of 0.32, 95% Confidence Interval [CI]=0.17, 0.48 for the diabetes education group; difference of 0.46, 95% CI=-0.28, 1.19) for the diabetes plus kitchen class group). Even though the diabetes education plus kitchen intervention had the largest reduction in hemoglobin A1c, the sample was small with large variation.

Conclusions

Integrating a teaching kitchen component into the traditional diabetes education curriculum is a promising approach that can further improve initial biometric outcomes. Future studies are warranted to demonstrate clinical effectiveness of this enhanced intervention.

Financial Support

Health Share Oregon Coordinated Care Organization

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38. *Development and implementation of take-home naloxone kit for patients admitted to the emergency department of a large tertiary care hospital*

Myung Seon (Amy) Song, PharmD; Pamela Levine, PharmD, BCPS; Katharine F. Marshall, MD;
Chelsea Harmon, PharmD Candidate 2020

Background/Purpose:

In 2017, the United States Department of Health and Human Services (HHS) declared the opioid epidemic as a public health emergency as more than 70,000 people died from drug overdoses. Approximately 75% percent of unintentional opioid-overdose deaths occurred outside of a medical setting. In order to combat the opioid crisis, the US Surgeon General urged prescribers and pharmacists to increase access to naloxone for individuals who are at risk for opioid overdose. Community overdose education and naloxone distribution (OEND) programs have demonstrated that take-home naloxone kits are associated with reduced opioid-overdose death rates and are cost-effective. From January 2016 – June 2019, about 4,016 emergency department (ED) and urgent care visits in the Portland metropolitan area were identified to be due to opioid overdose. Recent data from the Centers for Disease Control and Prevention (CDC) indicates a continuing upward trend, making the ED a critical intervention point for providers and pharmacists to engage patients with at-risk of opioid overdose and provide evidence-based interventions such as take-home naloxone kit. The primary objective of this study is to develop and implement a pharmacist driven take-home naloxone kit protocol. The secondary objective is to increase access to naloxone by prescribing and dispensing kits to at-risk patients in the emergency department.

Methods:

A retrospective quasi-experimental, pre- and post-protocol analysis, will be used to compare the number of prescriptions written prior to implementation of protocol (April 1, 2017 to September 1, 2019) to the number of take-home naloxone kit dispensed post implementation of the protocol. Inclusion criteria include patients 18 years or older and admitted to ED for treatment of opioid overdose, or with risk factors of opioid overdose. The primary endpoint is number of naloxone prescription written and take-home naloxone kits dispensed.

Results:

Key stakeholders were identified and engaged in developing the protocol. Operational and cost consideration were reviewed. Various factors affected development and implementation of the study.

Conclusions: Adaptation of parts of the study to take place in two large tertiary care hospitals.

IRB status: Pending

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39. ***Pharmacoeconomic impact of patient-centric oncology service model***

Kasey Rubin PharmD, Samuel Jacobson PharmD. BCOP, Shannon Buxell PharmD.

Providence Health & Services recently embedded ambulatory oncology pharmacists into the ambulatory oncology clinic setting. The overall purpose of this retrospective study is to quantify the financial benefits of ambulatory oncology pharmacists as well as quantify patient-centric factors through utilization of an onsite specialty pharmacy. This study was submitted and approved by Institutional Review Board. Electronic health records of patients who visited the ambulatory oncology clinic will be retrospectively reviewed over two time periods: 12 months preceding integration of a pharmacist and 12 months post integration of a pharmacist on the ambulatory oncology team at Providence Portland Medical Center (PPMC). Each group will consist of 250 patients. The following patient data will be collected: Patient MRN, Patient visit encounter (if multiple visits), sex, ICD10 code for diagnosis, number of prescriptions/dispense report, cost of medication, financial revenue, nausea scores, pain scores, and number of Interventions completed by pharmacists. These endpoints will be assessed and an estimated dollar amount will be attached to each non-monetary service provided by pharmacists. Epic projects an equivalent dollar amount per each intervention completed by a pharmacist. This projected dollar amount will be utilized to quantify the benefits of a pharmacist and will be considered as cost-savings. Number of prescriptions/dispense report and cost data will be provided by Providence specialty pharmacy, Credena. Credena utilizes Epic and CPR+. The primary investigator will not access to CPR+ and will defer to secondary investigators to collect prescription data.

Preliminary pharmacoeconomic data will be presented. Clinical results from the addition of the pharmacists show an initial review of the oral antineoplastic in 70% and 86% of patients in sites #1 and #2, respectively. Follow-up calls were made to 55% and 85% of patients in sites #1 and #2, respectively. Patients getting their prescriptions through Credena are continually counseled by Credena specialty pharmacists. Pharmacists reviewing medications reviewed drug-drug interactions, with the true number of interventions not able to be calculated. In conclusion, pharmacists have added both financial and patient centered benefits after integration with the care team.

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**40. Empowering caregivers to recognize, support, and treat opioid use disorder:
an interdisciplinary assessment of knowledge, attitudes, and comfort level
pre and post-education**

Annette Sprankle, PGY1 Pharmacy Resident, PMMC

Background: Substance use disorder affects approximately one in every four hospitalized patients. These patients are often treated for the admitting medical issue without addressing their substance use disorder. A hospital admission provides an opportunity to connect patients to the medical system. Evidence demonstrates that starting medication-assisted treatment in the hospital reduces the risk of overdose upon discharge, rate of hospital readmission, length of stay, and hospital expenditures.

Purpose: The purpose of this study is to assess how providing education to the interdisciplinary team affects their knowledge, attitudes, and comfort level of treating patients with opioid use disorder in the hospital.

Methods: This study has been approved by the Institutional Review Board. A formalized pre-education survey was developed and administered to members of an interdisciplinary team on a voluntary basis. Members include pharmacists, hospitalists, nurses, social workers, and case managers. Attitudes regarding medication-assisted treatment, baseline knowledge, and comfort level of treating patients with opioid use disorder were assessed. Interdisciplinary education modules were developed and presented to the team by the resident including the identification, treatment, monitoring, follow up, and education of patients with opioid use disorder. A post-education survey was administered to reassess the same parameters as the pre-education assessment. Prescribing data for initiation of buprenorphine and methadone was analyzed comparing data for a 3-month time frame before education and a 3-month time frame after education was provided. Pregnant patients or patients under 18 years of age were excluded from this analysis. A Mann-Whitney test was used to analyze each question rated on a Likert scale. A one-tailed test was utilized with a p-value of <0.05 set as the threshold representing statistical significance.

Results: Fifty-nine caregivers answered a pre-education survey and nineteen caregivers participated in the post-education survey. All disciplines reported an increase in knowledge base after receiving education. This was determined by question one ($p=0.0222$), two ($p=0.00049$), four ($p=0.00075$), and five ($p=0.00706$) of the survey. Comfort level measured by question six of the survey was not unanimous for increased comfort ($p=0.299$). Nurses reported increased confidence in recognizing the symptoms of withdrawal ($p=0.0178$), comfort asking patients about their withdrawal ($p=0.0392$) and comfort in administering the clinical opiate withdrawal assessment ($p=0.0108$) after education. Pharmacists reported increased confidence in speaking to the advantages and disadvantages of buprenorphine versus methadone ($p=0.0129$) and comfort in providing dosing recommendations ($p=0.0402$). Case managers and social workers had no change in feelings that there is an adequate outpatient pathway to connect these patients to care upon discharge. No hospitalists participated in the post-education survey. Two patients in three months were initiated on medication-assisted treatment before education. Four patients were initiated in the three months after education was provided.

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41. Clinical Pharmacist-Led Intervention to Improve Statin Metric for Secondary Prevention at Providence Medical Group – Southern Oregon Region

Chloe Nguyen, PharmD, Judy Wong, PharmD, BCACP, and Karen White, PharmD, BCACP

Background: Currently, there is a gap in meeting the statin metric at Providence Medical Group in Southern Oregon Region. The purpose of this project is to identify intervention strategies to improve statin metric for secondary prevention among patients with clinical atherosclerotic cardiovascular disease (ASCVD).

Methods: This quality improvement project was approved by the system's Institutional Review Board. Patients at least 18 years of age with diagnosis of clinical ASCVD not prescribed statin therapy or prescribed sub-optimal statin therapy were included. Different strategies were implemented at Central Point Family Medicine Clinic. A presentation was delivered to the providers in late December to address barriers with statin prescribing. Pre- and post-surveys were collected to assess the effectiveness of the presentation and knowledge of providers regarding statin prescribing in patients with clinical ASCVD. Chart reviews were performed in January on identified patients to provide recommendation to providers. The primary outcomes were to assess impact of academic detailing intervention on perceived barriers on statin initiation or optimization via pre- and post-surveys and to calculate the percentage of approved recommendation from providers. The secondary outcome was the percentage of statins prescribed per each intervention strategy: refer to clinical pharmacist for management, discuss statin therapy during the next appointment with provider, or update problem list and medication list.

Results: Prior to the intervention, a majority of providers believed that statins caused myopathy, liver injury, and rhabdomyolysis which can influence their decision when prescribing statin therapies and discussing statin treatment with patients. Post-survey results showed a slight decrease in belief that statins cause myopathy, liver injury, incidental diabetes, cognitive impairment and rhabdomyolysis. In addition, providers were more likely to retry a different statin or at a lower dose if patient had a documented intolerance to previous statin therapy following education.

In a sample of 35 chart reviews, 5 patients were receiving sub-optimal statin therapies, 7 had documented reason for statin intolerance, and 3 were not candidates to receive high intensity statin. A majority of recommendations were approved by providers. The most common intervention chosen by providers (51.4%) was to discuss statin options with patient in next office visit. However, no changes were observed from this intervention. Out of the 10 patients who were referred to clinical pharmacy services for management, 5 declined statin and 4 were unable to reach. Only one patient was successfully started on high intensity statin.

Conclusions: Beliefs and approaches to statin discussions are varied among PCPs and can be contributing factors for statin initiation or optimization. These results highlight the complexity of finding interventions that would be most successful for improving statin metric for secondary prevention among patients with clinical ASCVD. Nonetheless, we can be vigilant about working with providers to provide recommendations for the remaining patients with clinical ASCVD and create appropriate follow-up plans for those who were unable to be reached and those who do not have upcoming appointment with providers.

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42. *Education of heparin per pharmacy guidelines to increase compliance, safety, and pharmacists' management of heparin infusions*

Christopher Truong, PharmD and Braxton Mehl, PharmD, BCCCP

Background:

Element of Performance 4 of The Joint Commission's National Patient Safety Goal 03.05.01 requires that hospitals have a written policy that addresses the need for baseline and ongoing laboratory tests to monitor and adjust anticoagulant therapy. Our hospital has a written Anticoagulation Management General Operating Policy for heparin orders managed through nursing or pharmacy. Currently, most heparin orders are nurse-managed and have resulted in lab and dosing errors.

Purpose:

The purpose of this project is to educate pharmacists on the Providence Oregon Region Heparin Guidelines as our hospital moves towards increasing pharmacists' management of heparin infusions.

Methods:

Pharmacists were trained in the Providence Oregon Region Heparin Guidelines through an education session and quiz that required application of the heparin guidelines. A post-education survey was administered to each pharmacist that received training. Scores from the survey were tallied to assess the effectiveness of the training. After the session, the heparin-per-pharmacy order was made available at our facility and pharmacists' adherence to the guidelines were evaluated. The primary outcome was the results from the post-education survey. Secondary outcomes include the number of heparin per pharmacy orders and adherence to the heparin guidelines by assessing the required baseline and follow-up labs and the appropriate loading, initial, and adjustment doses. Other secondary outcomes include time to therapeutic aPTT, signs or symptoms of bleeding or bruising, and the number of progress notes completed by pharmacists. Primary and secondary outcomes were analyzed with descriptive statistics. This project is IRB approved.

Results:

Eight pharmacists completed post-education surveys. The average pre-education survey score was 2.9 out of 5 and the average post-education survey score was 4.4 out of 5, resulting in an average 1.5 score improvement after attending the education session. Pharmacists scored the practice quiz and education session's helpfulness as 4.4 out of 5 and 4.8 out of 5 respectively.

Between February 20, 2020 and April 9, 2020, there were 11 heparin per pharmacy orders. Pharmacists managed 9 orders and 2 orders were not verified by pharmacy. Required baseline and follow-up labs were ordered in 100% of orders. Appropriate initial bolus and infusion doses were ordered in 100% of orders. Appropriate adjustment doses were ordered in 88.9% of orders. The average time to therapeutic aPTT was 12.68 hours. No signs or symptoms of bleeding were noted. A total of 68 heparin progress notes were completed by pharmacists.

An education session and quiz were effective methods in training pharmacists to a heparin per pharmacy system guideline.

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43. ***Incorporating a clinical pharmacist in an outpatient palliative care team***

Crystal Rim, PharmD; Sharon Leigh, PharmD, BCPS; Linda De Sitter MD, MPH; Mary Grant, ANP; Dana Nguyen, PharmD

Palliative care is a growing field in medicine that focuses on delivering care that improves quality of life for patients with serious illnesses. Often, the goals of palliative care differ from traditional goals of medicine. Currently, there is limited data demonstrating the integration of pharmacists in the palliative care setting. The purpose of this quality improvement is to evaluate the clinical pharmacist's role within an outpatient palliative care team when performing medication reconciliation and review. Medication review includes de-prescribing high-risk medications and optimizing medications in symptom management. Between January and February 2020, the clinical pharmacist interviewed patients referred to the outpatient palliative care service through three different methods: telehealth, pharmacy consult and telephone. The clinical pharmacist provided recommendations to the outpatient palliative care nurse practitioner and primary care provider for medication optimization, symptom management and de-prescribing based on STOPP/Frail and Beers Criteria. Data from 19 patients were analyzed. One patient was excluded from analysis due to death. Five patients were interviewed through telehealth. Two patients were directly consulted for pharmacist review by the outpatient palliative care nurse practitioner. Seven patients were interviewed through telephone, of which 4 patients were referred to hospice following palliative care consult. Of 19 patients, 64 total recommendations (29 medication discontinuation, 30 medication optimization, 5 symptom management) were made. Six recommendations were accepted by the provider (3 medication discontinuation, 3 medication optimization). The average time spent on chart review for each patient was 1.5 hours. Pharmacist involvement in outpatient palliative care may be valuable. However, many barriers to providing meaningful interventions were identified in this study. While telehealth provided the convenience to the patient and caregivers, utilization was limited due to lack of standardization of technology. Telephone interviews allowed proper medication reconciliation prior to the palliative care visit, but non-medication related issues may be prioritized after the visit. Finally, pharmacy consult from palliative care nurse practitioners allowed more efficiency, but it did not allow formal pharmacist integration in the outpatient palliative care team. Further studies quantifying the pharmacist role in outpatient palliative care are warranted.

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44. Evaluation of a two-way, HIPAA-compliant text-messaging platform in a health system specialty pharmacy

DJ Clark, PharmD, PGY1, Adam Saulles, PharmD, CSP, BCACP;
Tara Berkson, PharmD, BCACP

Evaluation of a two-way, HIPAA-compliant text-messaging platform in a health system specialty pharmacy

Specialty medications, including those used to treat Multiple Sclerosis (MS), represent a growing proportion of prescription drug expenditures in the United States. MS is a chronic, progressive condition that requires maintenance therapy with disease-modifying medications. Many patients with MS rely on specialty pharmacies to obtain, dispense, and perform the necessary monitoring for these complex medication regimens. A study performed in 2017 by Munsell et al, demonstrated that only ~50% of patients with MS are adherent to prescribed regimens when initiating disease-modifying therapy. Routine pharmacy outreach could potentially help improve medication adherence in a population at high risk of disease progression secondary to non-adherence. Prior to July 2019, this health system specialty pharmacy only contacted MS patients via phone call to perform refill coordination and pharmacist follow-up. This strategy has been effective, but is not without flaws. Oftentimes, patients prefer not to receive phone calls or are unavailable during pharmacy business hours. This can lead to repeat outreach phone calls from caregivers and gaps in therapy. In July 2019, a HIPAA-compliant messaging platform was implemented. With this program, patients can respond to refill inquiries at their convenience and provide typed responses to medication-related safety, adherence, and efficacy follow-up questions sent by specialty pharmacists. This project seeks to identify whether implementation of the aforementioned messaging platform has had a quantifiable benefit on patient outreach and workflow outcomes within a health system specialty pharmacy setting. This single center, retrospective cohort analysis evaluated adult patients with a diagnosis of MS and at least 2 dispenses of disease-modifying medications. Data was collected via the electronic health record and the implemented text messaging application. The primary outcome is time between pharmacy technician outreach and medication refill. Secondary outcomes include medication adherence reported as medication possession ratio (MPR), the proportion of patients enrolled in the specialty pharmacy's patient management program, patient satisfaction, and pharmacy phone call volume. Between group differences were described using simple descriptive statistics and T-tests, where applicable. A total of 335 patient had fills prior to and post-implementation of the text messaging platform, and 313 had multiple fills in each category, allowing for calculation of MPR. Response time (HH:MM \pm 95% Confidence interval) was significantly decreased with utilization of text-message refill reminders (32:03 \pm 7:09 vs 68:34 \pm 11:37; $p < 0.001$). Patients also had a higher MPR when utilizing the text-messaging platform (0.94 \pm 0.01 vs 0.90 \pm 0.02; $p < 0.001$). A higher proportion of patients were enrolled in the pharmacy's clinical management program after implementation of the text-messaging platform (82% vs 61%). A positive impact on patient satisfaction was realized via surveys, while call volume was not reduced overall. This HIPAA-compliant text-messaging platform is being utilized to successfully improve patient response time for refills, treatment adherence, and overall engagement with clinical pharmacy services, while delivering a positive patient experience. These results will be pivotal in expanding use of a text-messaging platform to patients filling specialty medications for other conditions. (IRB Approved)

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45. *Evaluation of surgical antibiotic prophylaxis at a large, tertiary medical center*

Emily Fox, PharmD, PGY-1, Brent Footer, PharmD, BCPS; Angel Mendez, Pharmacy Student

Surgical site infections (SSI) are a significant cause of morbidity, prolonged hospitalization, and mortality. The cost of a single SSI is estimated to be upward of \$25,000 and increases a patient's length of hospital stay by ~10 days. Our institution has identified inappropriate or less than optimal antimicrobial prophylaxis as a potential contributor in several recent SSI cases. Current literature on this topic has found that there may be a role for clinical pharmacists in cyclic auditing to improve surgical antibiotic prophylaxis guideline adherence. This retrospective analysis of hysterectomy, colorectal, and spinal surgeries aims to review surgical antimicrobial prophylaxis for appropriateness based on patient-specific factors and published system and national guidelines.

This is an IRB-approved, single institution retrospective chart review of surgical antibiotic prophylaxis regimens for adult patients that underwent hysterectomy, colorectal, or spinal surgery between the months of June and August 2019. Specific surgery types were chosen based on requests by surgery leadership and highest potential for quality improvement. Patients were identified by surgery classification via the electronic medical record (EMR). Other relevant data was obtained via the EMR including: surgeon, anesthesiologist, antibiotic regimen, dose, administration time, ordering method, and patient weight. Additional chart review was required for other relevant factors including history of multi-drug resistant organisms and allergy history/severity. The primary outcome measured was compliance to hospital system guidelines, accounting for antibiotic selection, administration timing, and dosing.

Primary outcome adherence rates varied greatly depending on the type of surgery. For hysterectomy, 62 of 141 surgeries (44%) achieved the primary outcome, with the primary contributor of non-compliance being selection of an antibiotic regimen inconsistent with system-wide guidelines. For colorectal surgeries, 21 of 35 (60%) achieved the primary outcome, with the primary reason for non-compliance being inappropriate antibiotic administration timing. Additionally, it was identified that history of resistant infections was not properly accounted for when making antibiotic prophylaxis choices, with 3 SSIs resulting from multi-drug resistant organisms in patients with MDRO history. Spinal surgery compliance to the primary outcome was less-clear, as guidelines are not as well-defined. However, MRSA colonization status was not determined via PCR when appropriate for 31 of 148 (21%) of surgeries.

Opportunities for pharmacist intervention and education were identified for implementation after chart review of each surgery. Each surgery requires a unique intervention. Primary outcome data and proposed interventions for each surgery was presented to the institutional surgical site infection committee, which met quarterly. Pharmacist cyclic auditing of antibiotic prophylaxis choices resulted in increased discussion and education. Proposed changes are still being considered by surgery department leadership, including a change in antibiotic choice for colorectal surgeries. Future data collection will be performed after changes are implemented to determine improved guideline adherence.

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46. *Safe Opioid Prescribing at Discharge*

Taylor Goodman, PharmD, Elva Van Devender, PharmD; Luetta Jones, PharmD; Courtney Barber

Background/Purpose: The opioid epidemic has led to devastating consequences, especially in Oregon, with an average of five Oregonians dying each week from opioid overdose. Opioid prescriptions at discharge are correlated with future continued opioid use. United States providers prescribe more opioids both inpatient and at discharge than other countries, and Oregon providers wrote more opioid prescriptions per person than the national average. Oversupplying prescription opioids can lead to reservoirs of unused medication, creating opportunities for non-medical use and overdose. Pharmacy interventions have shown significant improvement in safe opioid prescribing practices at hospital discharge. However, inpatient discharges still represent a major source of high-volume opioid prescriptions. The purpose of this study is to evaluate hospital discharge opioid prescriptions and to assess the impact of data sharing and education on subsequent discharge prescribing practices.

Methods: This was a retrospective review of discharge opioid prescriptions for adult hospitalist patients discharged from two, large, tertiary hospitals during July 2018, September 2019, and either February 2020 or February 18th thru March 18th, 2020 depending on the location. Eligible patients' data elements including discharge opioid, quantity of opioid tablets (QTY), morphine milligram equivalence (MME), concomitant benzodiazepine prescription, ordering provider, and ordering department were evaluated for pre and post intervention implementation analysis. Data was collected through a review of orders in the electronic health record (EHR). Further investigation into charts was completed for necessary additional information if needed. The primary outcome is hospitalist group opioid discharge prescribing practices pre and post multiple interventions (EHR changes to default quantity on new orders, addition of MME daily calculation and provider education) and provider education alone presented on either January 21st or February 11th, 2020. Secondary outcomes include department and individual provider prescribing practices. This study has been approved by the institutional review board.

Results: At Hospital A, both the average quantity of tablets and MME per discharge decreased post EHR and education interventions, then increased (25.8 to 23 to 25 and 198.3 to 177.5 to 195.6 respectively) post education only intervention. At Hospital B, a similar trend in both the average quantity of tablets and MME per discharge post interventions (34.9 to 23.3 to 25.8 and 303.5 to 191 to 212 respectively) was seen. The percentage of <30 tablet discharge prescriptions also overall decreased (62% to 62.7% to 67.5% at Hospital A and 50.6% to 70.2% to 66.5% at Hospital B).

Conclusion: Results comparison prior to intervention (2018) to post intervention (2019 and 2020) indicate that it was effective in promoting safer prescribing practices however education/data sharing only intervention may be more effective when combined with more system orientated interventions. While longer term monitoring and individual provider follow up is needed to elicit the true impact of provider education and data sharing intervention, future efforts should combine multiple interventions. These should target the individual via continued education/data sharing and system processes via workflow adjustments such as encouraging utilizing new opioid orders upon discharge. Targeting specific service lines could help identify more opportunities to promote safer prescribing practices going forward.

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47. Evaluation of Guideline-Directed Medication Therapy for Heart Failure with Reduced Ejection Fraction Patients at Discharge on 30-Day Readmission Rates at Two Tertiary Healthcare Centers

Jacqueline Hesse, Pharm.D., Yan Xu, Pharm.D., BCPS, BCCP; Meri Slavica, Ph.D., BCPS, James Watkins, 2020 Pharm.D. Candidate, Alan Rankin, MD; Joshua Remick, MD

Background: Heart failure with reduced ejection fraction (HFrEF) is a chronic, progressive disease leading to symptoms such as dyspnea, cough, edema, fatigue, and exercise intolerance. The use of an angiotensin converting enzyme inhibitor (ACEi), angiotensin II receptor blocker (ARB), or angiotensin receptor-neprilysin inhibitor (ARNI) in combination with an evidence-based beta blocker (BB) is guideline-supported Class I recommended therapy for HFrEF with an LVEF <40%. Multiple studies with the combination of these medication classes have shown improvement in HFrEF patient morbidity and mortality, as well as decrease in hospital readmission rates. In 2019, the readmission rate for any heart failure diagnosis within 30 days is 13.6%-15.07% at these tertiary medical centers. Approximately 50% of these total HF admissions are estimated to be due to HFrEF. Prior scientific literature supports the clinical benefits appropriate, safe, and guideline-directed medication therapy (GDMT) with an ACEi, ARB, or ARNI with or without a BB, particularly as it pertains to HFrEF-related readmissions and mortality, but has not yet been studied at our two tertiary medical centers.

Methods: A retrospective chart review was completed using the Epic Electronic Medical Record of all patients admitted to one of our tertiary medical centers between January 1, 2018 and December 31, 2019 with a primary diagnosis of HFrEF. Patients were included if they were at least 18 years of age and had an LVEF of <40%. Patients were excluded if they had a history of angioedema as a result of ACEi, ARB, or ARNI use, or any hypersensitivity or unacceptable side effect to an ACEi, ARB, ARNI, or BB. Readmission to one of our tertiary medical centers within 30 days of discharge within this time frame, as well as the guideline-directed medication therapy a patient was discharged on was recorded. Secondary endpoints of highest serum creatinine (SCr), highest potassium (K), and lowest systolic blood pressure (SBP) were also collected if a patient was readmitted within 30 days of discharge, and cause of HFrEF and incidence of angioedema were collected for all patients meeting inclusion criteria.

Results: A total of 1,999 patient admissions underwent chart review with 752 admissions not meeting inclusion criteria and 1,247 admissions being included in the final analysis. Of those included, 202 patients (16%) were readmitted within 30 days. Patients discharged with any GDMT had less readmissions within 30 days than those without any GDMT (OR 0.6, 95% CI 0.4-1.0, $p = 0.0369$). However, patients discharged on an ACEi or ARB had more readmissions within 30 days than patients discharged on no GDMT (OR 1.4, 95% CI 1.0-1.9, $p = 0.0283$). 49% of patients ($N = 609$) had an idiopathic cause of heart failure followed by 32% of patients with non-ischemic cardiomyopathy ($N = 394$) and 20% of patients with ischemic cardiomyopathy ($N = 244$). No significant differences were found between the 30-day readmission rate and cause of heart failure. For highest K value on readmission, no significant differences were found between groups. For highest SCr on readmission, discharging on an ACEi or ARB or discharging on an ACEi or ARB in combination with a BB yielded a significantly lower SCr on readmission compared to no GDMT (1.6 vs. 2.6, $p = <0.0001$ and 1.7 vs. 2.4, $p = 0.0002$, respectively). The combination of ARNI and BB compared to no GDMT was also statistically significant for lower SCr (1.7 vs. 2.2, $p = 0.0443$). For lowest SBP on readmission, discharging on a BB or discharging on any GDMT yielded a significantly higher SBP on readmission compared to no GDMT (89.6 vs. 82.1, $p = 0.0135$ and 89.1 vs. 78.1, $p = 0.0081$, respectively). Lastly, no significant differences were found between groups in the incidence of angioedema.

Conclusion: In conclusion, patients admitted with a primary diagnosis of HFrEF that are discharged on any GDMT were found to have less readmissions for any reason within 30 days than those without any GDMT. However, subgroup analysis for individual GDMT may not have a lower rate of readmissions. Further research with prospective randomized controlled trials is needed to determine statistical significance of subgroups of GDMT on the rate of readmission within 30 days.

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48. Effect of a pharmacist-led antimicrobial stewardship (AMS) program on outpatient fluoroquinolone prescribing in the elderly

LaRue, Katie PharmD; Mannebach, Chelsea PharmD, BCPS, BCACP;
Jiron, Bonnie, PharmD, BCACP

Introduction: The Center for Disease Control and Prevention, the Society of Infectious Diseases Pharmacists, and American Pharmacists Association recognize the need for outpatient AMS programs and the important role pharmacists play in appropriate prescribing. Fluoroquinolones (FQ) pose many risks, highlighted by U.S Food and Drug Administration safety warnings, including aortic dissection, hypoglycemia, mental health side effects, and tendonitis, along with the risk of *Clostridium difficile* infections, particularly in the elderly.

Outcomes: The primary outcome is to determine the change in the number of FQ prescriptions written for patients ≥ 65 years of age in the primary care setting between March 2018 and 2019, and March 2019 and 2020. Secondary objectives include determining the appropriateness of fluoroquinolone prescriptions before and after education intervention, and provider attitudes towards outpatient AMS.

Methods: Education on fluoroquinolone antibiotic risks, safety warnings, and guideline-directed uses was provided to prescribers in February 2020. During education, prescribers were given a report of the number of fluoroquinolones prescribed to patients ≥ 65 years of age during March 2018 and March 2019 with comparison to other prescribers. Data was collected for March 2020 and a similar report was given to prescribers. Approximately 15% of fluoroquinolone prescriptions were reviewed for secondary outcomes. Changes in fluoroquinolone prescriptions will be analyzed by Bayesian inference and secondary outcomes will be reported with descriptive statistics.

Results: There was a decrease in the total number of fluoroquinolone prescriptions in March 2020 (n=134) compared to March 2019 (n=200) and March 2018 (n=272). After secondary review of 15% of these prescriptions, there was an increase in appropriately prescribed fluoroquinolones from 2.4% in March 2018 (n=41) to 27.8% in March 2020 (n=18). Of 118 providers surveyed before and after the educational presentation, 6.8% correctly identified all risks associated with fluoroquinolone therapy prior to the education and 84.1% correctly identified all risks associated with fluoroquinolone therapy after receiving education. After the education, an increase in providers reported being very comfortable discussing the risks and benefits of FQ therapy with their patients, from 23% prior to the education to 65% after the education.

Conclusions: Provider education on risks associated with fluoroquinolone use in the elderly and individualized provider reports was associated with a decrease in total fluoroquinolones prescribed to patients ≥ 65 years of age in the included primary care clinics. Additionally, a higher percentage of fluoroquinolones were prescribed appropriately based on evidence-based guidelines. Ongoing AMS efforts are needed to continually improve patient safety and reduce unnecessary antimicrobial exposure.

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49. Evaluating outcomes of medication-related interventions from the “Seniors At risk for Falls after Emergency Room visit” (SAFER) pilot project

Ling J. Zhan, PharmD, Sharon Leigh, PharmD BCPS, Mary Beth Kuebrich, MS, AGPCNP-BC, Clara Mikhaeil, PharmD, BCPS, Colleen M. Casey, PhD, ANP-BC

Purpose: Falls are the leading cause of injury in older adults, resulting in decreased mobility, loss of independence, and increased health care costs. Even a single fall puts an older adult at higher risk for future falls. Despite numerous studies showing evidence that multifactorial fall risk interventions are effective in decreasing fall risk, even older adults who have an injurious fall often do not receive meaningful interventions to mitigate their fall risk. This study evaluated the impact of medication-related interventions for older adults who had a fall-related ED visit, as part of a larger study of multifactorial fall-risk interventions in the primary care setting.

Methods: This study was approved by the Providence-Oregon Institutional Review Board. This retrospective chart review studied a subset of patients enrolled in the SAFER pilot project who presented to an ED following a fall. Included patients were 75 years or older and taking at least one high-risk medication (HRM) that is associated with increased risk for falls. Patients were enrolled in the SAFER pilot from December 2018 to June 2019. Eligible patients received a comprehensive medication review by a clinical pharmacist; some also received a Geriatric consult that included medication recommendations. Medication recommendations were then forwarded to the clinic's Primary Care Provider (PCP) and Registered Nurse for follow up. The parent study used a matched control design to compare SAFER interventions with usual care; this study did not include a comparison to the control group. Study outcomes included: overall burden of high-risk medications, number of high-risk medications discontinued or tapered, initiation of osteoporosis treatment or prevention measures, changes in blood pressure (BP) or hemoglobin A1c goals, and overall reduction in polypharmacy. The study also evaluated to what degree medication-related recommendations were adopted by the PCP over a minimum follow-up period of 7 months.

Results: Overall, 50 patients underwent chart review with 4 patients not meeting inclusion criteria; 46 patients were on HRM (average 4.3 HRM/person) and included in the final analysis. Of those patients, 25 (54%) received a PharmD consult. For these 25 patients, 117 medication-related recommendations were made by the Geriatric and Clinical Pharmacy teams. Of those, a total of 52 (44%) changes were implemented by the PCP: 17 HRMs were discontinued, 9 taper/cross-tapered, and 17 osteoporosis-related initiated. BP and A1c goals on patient's problem list were not clearly defined for 69% and 50% of patients, respectively.

Conclusion: Medication optimization and reduction of HRM was effective in patients receiving a PharmD consult. The most accepted recommendations included ordering DEXA, orthostatic BP testing, adding Vitamin D, and discontinuing opioids. Not every patient who qualified received a PharmD consult, suggesting that more medication changes could have been implemented had PharmDs been involved. The process of referring to a PharmD for a consult will need to be reviewed. Given that these patients are at high risk to fall, BP and A1c goals should be clarified and perhaps more lenient goals may be indicated. In addition, these results should be compared with the matched-control group of the parent study to determine the value of reducing HRM use in older patients at high risk of falls.

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50. ***Evaluation of late-onset sepsis antibiotic utilization and revision of empiric late-onset sepsis antibiotic prescribing guidelines***

Alex Creevan, PharmD, Michael Garcia, PharmD, Angela Roberti, PharmD, Sara Clark, PharmD, Anavice Jimenez, PharmD Candidate

Neonatal late-onset sepsis (LOS) is commonly defined as an infection occurring after the first 72 hours of life. Late onset sepsis is a common complication of prolonged admission to the neonatal intensive care unit (NICU) and is a major cause of morbidity and mortality. Due to risks associated with LOS, empiric antibiotics can be inappropriately prescribed, which may lead to multi-drug resistant bacteria, increased healthcare costs, alterations in microbiome, increased risk of necrotizing enterocolitis (NEC) and mortality. Current Providence Oregon regional guidelines for suspected LOS in the NICU do not provide clear prescribing or antibiotic dosing recommendations, have not been updated since 2011, and are underutilized by providers. All of which can lead to inappropriate antibiotic prescribing. Providers at two tertiary medical centers agreed upon using American Academy of Pediatrics (AAP) Red Book for antibiotic dosing in October 2019. A retrospective chart review was conducted to evaluate the appropriateness of antibiotic utilization in the NICU at two tertiary medical centers, and to promote standardization of antibiotic prescribing for LOS through revision of the 2011 regional empiric antibiotic guidelines for suspected LOS in the NICU. This study was approved by the institutional review board. Patients admitted to the NICU between September 1, 2016 through August 31, 2019 with confirmed or suspected LOS who received at least one dose of empiric antibiotics starting after 72 hours of life were included in the study. The primary outcome is to measure the appropriateness of antibiotic utilization compared to the 2011 Providence Oregon Regional guidelines and recommendations from the neonatal antibiotic dosing references AAP Red Book, Lexicomp, Neofax, or "other" if dosing did not match one of the specified reference. The secondary outcome measure of revision and implementation of new late-onset sepsis guidelines is still in progress. Exploratory outcomes include antibiotic selection, indication, and duration of therapy. Patient data such as risk factors for LOS, diagnosis, gestational age, postnatal age and postmenstrual age at time of antibiotic initiation, birth weight, blood culture and susceptibilities, and outcomes such as mortality, transfer to a higher level of care, discharge home, and further courses of antibiotics were also included as exploratory outcomes. Thirty-five patients were identified as having at least one instance of LOS, and there were 45 instances of LOS total, as some patients had more than one occurrence. After excluding antibiotics dosed by pharmacy (vancomycin and gentamicin), 55 antibiotics were evaluated based on neonatal antibiotic dosing reference. For the primary outcome, 47% (21) empiric antibiotic regimens did not correspond with the 2011 guideline. Fifty-three percent (29) of antibiotic dosing matched AAP Red Book recommendations, 29% (16) matched Neofax, 5% (3) matched Lexicomp, and 13% (7) other. Nearly half of the empiric antibiotic regimes were not consistent with 2011 Regional guidelines. These inconsistencies are likely attributable to the vagueness of the guideline. In addition, while the majority of dosing matched AAP Red Book, antibiotic dosing reference utilization was highly variable. Prescribers would likely benefit from a standardized guideline for prescribing empiric antibiotics based on AAP Red Book dosing recommendations.

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51. Clinical Impact of an HIV Specialist Pharmacist Collaborative Practice Agreement: a 1-year Retrospective Review of Interventions

Rebekah Batholomew, PharmD, Geoffrey L'Heureux, PharmD, AAHIVP,
Brent Footer, PharmD, BCPS

Purpose/Background:

HIV continues to be one of the most complex disease states for patients and providers to manage. With new medications and guidelines being routinely updated, ensuring that patients are on optimal anti-retroviral therapy (ART) throughout their lives can be difficult. Previous studies on pharmacist-led HIV services have shown that utilizing a pharmacist to manage ART is beneficial. The purpose of this study is to add to that body of evidence by analyzing the clinical impact of a nascent collaborative practice agreement for an HIV specialist pharmacist to manage patients seeking care related to HIV.

Methods:

This study was granted exempt status by the Providence Institutional Review Board. An electronic health record was utilized to identify patients whom were seen at an HIV clinic under the management of a pharmacist. Chart reviews were conducted to collect and analyze pharmacist interventions. Data collected included the following: number of ART changes (and rationale for each change to be categorized as for efficacy, safety, or simplification reasons), number of patients seen for HIV/AIDS, PrEP, and PEP, number of patients enrolled in medication assistance programs (MAPs), HIV viral loads (VLs) and CD4+ cell counts over 1 year (each patients' level of control to be classified as improved, worsened, or no change), number of co-morbid disease state medication modifications, and number of coordination of care interventions. The data was recorded without patient identifiers to maintain confidentiality. Data analysis consisted of quantitative analyses.

Results:

A total of 100 patient charts were reviewed. Of those 100, 73 patients had their ART regimens modified. Of those 73 ART regimen changes, 54 were for safety related reasons (such as to avoid drug-drug interactions or to mitigate adverse drug reactions), 20 were for simplification reasons (such as to decrease pill burden), and 6 were related to improving efficacy due to genotype resistance testing. Some patients had their ART regimens changed for more than one reason. Of the 100 patients, 75 patients were living with HIV, 18 were on PEP, and 7 were on PrEP. Nearly half (49) were enrolled in MAPs with pharmacist assistance. Most patients' HIV VLs and CD4+ cell counts improved or stayed the same (89% VL and 79% CD4+). Few changes were made to co-morbid disease state medications (9 total modifications). Only 7 patients required coordination of care interventions.

Conclusions:

Because HIV medicine is so complex, there can possibly be a mentality of "don't change what is working" when it comes to which ART regimen patients are on. Leaving patients on the same regimen for years and decades may lead to medication related problems. Pharmacists are uniquely trained to help mitigate medication related issues. This study appears to show that pharmacists are most valuable in HIV medicine in mitigating safety concerns (drug interactions and adverse drug events). Pharmacists may also be especially useful in enrolling patients in MAPs.

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52. Standardizing Specialty Pharmacist Follow-up Frequency in Patients Prescribed Inflammatory Disease-Modifying Therapies

Rochelle Castrillo, PharmD, Linda Huynh, PharmD, Tara Berkson, PharmD,
Adam Saulles, PharmD, CSP, BSACP

Purpose: Specialty medications for inflammatory conditions have demonstrated decreased effectiveness, safety, and quality of life, largely attributable to inadequate medication adherence. Furthermore, with poorer health outcomes, patients face greater healthcare costs associated with exacerbations, flares, and hospitalizations. Monitoring for non-adherence, side effects, and health status changes is essential for patients diagnosed with inflammatory conditions. The benefit of a standardized pharmacist clinical follow-up assessment is currently lacking in specialty pharmacy literature. This study will implement a standardized pharmacist follow-up frequency guide and determine its clinical value and utility for patient safety and therapeutic goals in newly established patients diagnosed with inflammatory conditions.

Methods: A standardized follow-up frequency adjustment guide based on patient-specific factors, such as patient adherence, side effects experienced, and therapy efficacy was provided to all pharmacists where clinical consultations should be conducted at month 0, 1, and 4. After the implementation of the pharmacist guide, the electronic health system record was reviewed for all patients who received an inflammatory condition new patient consultation between August 5th, 2019 and October 4th, 2019. Pharmacist consultations are conducted by utilizing pre-designed assessment forms, the "New Patient Inflammatory Assessment" for initial consults and the "Specialty Medication Management Services (SMMS) Inflammatory Assessment" for follow-up assessments. How often pharmacists consistently stay within the standardized follow-up intervals versus how many times they deviate from the guide for patient care or safety reasons will be evaluated as the primary outcome. Secondary outcomes include categorizing and assessing the reasons for pharmacist deviation, assessing quantity and types of pharmacist (RPh) interventions made during deviations from the guide by medication and condition, evaluate patient reported medication adherence, quality-of-life (QoL) metrics, and pharmacist time spent per assessment. Patient-reported QoL was reported on a scale of 0 to 10, with 0 representing the best QoL and 10 representing poor QoL.

Results: There were a total of 154 patients enrolled into the study. Out of the 185 completed follow-up assessments, 36 were deviations. The reasons for pharmacist deviation from the guide included inability to reach the patient during standardized follow-up frequency (41.7%), RPh clinical decision that sooner follow up was necessary (27.8%), patient initiated consult (25%), and RPh failed to attempt follow-up consultation at month 1 and/or 2 (5.6%). Pharmacist interventions occurred predominantly at month 0 (71.7%), month 1 (15.5%), & month 4 (6.6%). The most frequent pharmacist interventions during consult deviations comprised of medication reconciliation (37%), and side effect management (33%), the remaining interventions were equal to or less than 7%. Following the initial assessment, the medication adalimumab and inflammatory condition psoriatic arthritis required the most pharmacist intervention at 32.2% and 21.5% of all follow-up interventions, respectively. However, it was tofacitinib and ankylosing spondylitis, which required the most pharmacist consultation time. Tofacitinib averaged 13.2 minutes and ankylosing spondylitis averaged 15.2 minutes per consultation. Patients taking adalimumab reported missed or late doses most frequently (33.3% of the 24 reported). Although QoL metrics were not consistently reported, there is a notable improvement from baseline to month 4. At month 0, the average patient-reported QoL was 5.6, while after 4 months of treatment, QoL scores improved to 3.6.

Conclusion: The standardized pharmacist follow-up frequency guide has provided a clinically meaningful strategy to monitor and follow-up with patients prescribed high-cost, high-risk inflammatory disease-modifying therapies. By establishing that the majority of clinically significant interventions occurred during the standardized frequency intervals, this guide accomplished maintaining patient safety, in addition to aiding patients with their clinical goals and overall quality of life. In addition, this data supports continuing a standard follow-up frequency at month 1 and 4 by demonstrating that no critical interventions were missed and most deviations occurred due to pharmacist's inability to reach patients during the pre-defined intervals. Although most pharmacist interventions occurred at the recommended intervals, it is important to consider patient-specific factors when determining follow-up frequency. Thus, it is reasonable for specialty pharmacists to utilize a standardized follow-up frequency guide that allows modifications based on clinical judgment to manage patients diagnosed with an inflammatory condition.

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**53. PD-1 and PD-L1 Inhibitors:
A Single Center Medication Assistance Program (MAP) Experience**

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Background: PD-1 and PD-L1 inhibitors are a large component of the growing immuno-oncology field and every year there are increasing studies investigating potential indications for these agents. This IRB approved retrospective chart review examines patients in the Medication Assistance Program (MAP) within a large tertiary medical center who are on PD-1 and PD-L1 medications due to financial barriers and/or non-FDA approved regimens (unlabeled indications). This study seeks to evaluate efficacy and safety of PD-1 and PD-L1 for unlabeled vs labeled indications within this population.

Methods: One hundred MAP patients treated with the PD-1 and PD-L1 inhibitors Opdivo (nivolumab), Keytruda (pembrolizumab) and Imfinzi (durvalumab) from October 2017- August 2019 will be analyzed in a reverse chronological order. The following data will be collected from the EMR: patient age, gender, medication, indication, duration of therapy, duration of therapy, labeled or unlabeled usage, if patient had a response, time to disease progression, concurrent therapies, total amount of drug administered, noted side effects, and if the FDA indication has changed since initiation. Labeled indications will be defined as medications that are FDA approved for the patient's cancer type at time of medication initiation. Unlabeled medications are those not FDA approved for a patient's cancer type at time of medication initiation. Evaluation of provider notes, lab tests and medication history records will be the primary data source for information collected. Primary objectives include evaluation of labeled vs unlabeled indications for PD-1 and PD-L1 inhibitors. Secondary objectives include determining time to disease progression, incidence of adverse drug reactions, and financial impact for institution and patient.

Results: Out of one hundred patients analyzed, 20% were on PD-1 and PD-L1 inhibitors for labeled indications and 80% patients were treated for unlabeled indications. The top three indications for PD-1 and PD-L1 inhibitors overall were head and neck (35%), gastroesophageal (17%), and breast cancer (12%) which was primarily driven by unlabeled patients. In stage IV head and neck, gastroesophageal, and NSCLC, unlabeled PD-1 and PD-L1 inhibitors demonstrated a greater average time to disease state progression compared to labeled indications (8.6 vs 7.3 months, 2.7 vs 1.1 months and 12.9 vs 0.5 months). The percentage of patients with grade 2 and 3 toxicities were comparable between the unlabeled and labeled indications with total incidence of ADR at 45% for labeled indications and 46.3% for unlabeled indications. The most common ADR requiring medications or delay of therapy was hypothyroidism (25% in labeled and 20% in unlabeled).

Conclusions: The majority of MAP patients are on PD-1 and PD-L1 inhibitors for unlabeled indications with the highest usage of Opdivo (nivolumab) at 74%. From our small sample size, there is promising data that PD-1 and PD-L1 inhibitors may prolong survival for several months longer for various indications including breast cancer, stage IV head and neck, gastroesophageal and NSCLC. These indications may later be incorporated into clinical trials as these agents seek new drug approvals.

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54. *Impact of real-time antimicrobial stewardship team intervention versus conventional microbiology reporting on time to appropriate antimicrobial therapy in patients with Enterobacterales bacteremia.*

Scott C. King, Alyssa B. Christensen, Brent W. Footer, Timothy G. Shan, Kim Health, Ivor Thomas, and Margret Oethinger

Introduction:

The benefit of rapid laboratory speciation combined with real time antimicrobial stewardship team (AMT) interventions has been shown to improve patient outcomes and decrease hospital costs. The Providence Oregon region conducts direct from blood culture matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) identification, which results in decreased time to organism identification. The MALDI-TOF identification has allowed the AMT to intervene earlier than a health system using standard MALDI identification or comparable methods. The purpose of this study is to assess the impact of real time notification plus AMT intervention on clinical outcomes in patients with Enterobacterales blood stream infections (BSI).

Methods:

This was an IRB approved, retrospective, multi-center, pre- and post- quasi-experimental study conducted at eight acute care hospitals in the Providence Health & Services Oregon region. Adult patients (>18 years old) with a diagnosed BSI caused by an Enterobacterales species were included. The control group was from August 2018 to January 2019 and the intervention group was from February 2019 to June 2019. Patients were matched based on age, gender, and admission to the ICU. Exclusion criteria included polymicrobial infection, Pitt bacteremia score >1, unable to take PO therapy, and patients discharged to hospice care.

During the intervention period the AMT members received real-time alerts for all blood culture speciation via a paging system. These cases were then reviewed and recommendations were made to the primary care team based off an approved protocol. The primary outcome for the study was time to de-escalation of therapy. Secondary outcomes include hospital length of stay and total duration of therapy.

Results:

A total of 60 patients were included in this study: 30 patients in the pre-intervention group and 30 patients in the post-intervention group. The most common age group was patients 60-69 years of age (43% vs 43%). The most common causative organism for the BSI was found to be Escherichia coli (76.7% vs 50%). During the intervention period a decrease was noted in median time to de-escalation of therapy (2.7 days vs 1.8 days, $p=0.0061$) and length of stay (5.3 days vs 4.3 days, $p=0.0475$). There was no statistical difference in the total length of therapy (combined inpatient and outpatient duration) noted between the two groups (9 days vs 9.5 days, $p=1$).

Conclusion:

The results show a statistically significant decrease in both time to de-escalation and length of stay within the intervention group due to AMT recommendations. This is in line with previous studies and also highlights the benefit de-escalation could have on length of stay in the hospital. Studies with larger sample sizes should be considered to further explore these results.

IRB Status: Approved

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55. *Manual scalp cooling in early stage breast cancer: value of caretaker training and patient-reported experience to optimize efficacy and patient selection*

Manaz Rezayee, BS, Nicole Moxon, RN, Staci Mellinger, RN, Amanda Y. Seino, Nicole E. Fredrich, Tracy L. Kelly, Susan Mulligan, MA, Patrick Rossi, MD, Ijeoma Uche, MD, Walter J. Urba, MD PHD, Alison K. Conlin, MD MPH, Janet Ruzich, DO, David B. Page, MD

Alopecia is an emotionally distressing common adverse effect of curative-intent chemotherapy in early stage breast cancer.^{1–6} Although machine-based scalp cooling is effective for reduction of chemotherapy-associated alopecia in early stage breast cancer, availability is geographically limited.^{7–11} Manual cold-cap systems may also be effective and are available regardless of geographic location.^{12–14} We evaluated the feasibility of caretaker-administered cold-cap efficacy following structured standardized training, and utilized patient-reported subjective outcomes to develop a clinical tool to facilitate patient selection.

Patients and Methods:

A small pilot study (n=10) was conducted to evaluate the feasibility and efficacy of manual cold capping. Key eligibility criteria included: 1) no hair loss at baseline; 2) no pre-existing scalp condition; 3) planned curative-intent chemotherapy for early stage breast cancer and 4) availability of caretaker (s). Participants received standardized training and then performed the cold-cap procedure without assistance. The primary endpoint was post-treatment hair retention using Dean's alopecia scale, with success defined as <50% hair loss. Secondary patient-reported outcomes (PROs) included QOL assessments (EORTC QLQ-C30, QLQ-BR23 and BIS), toxicity and subjective experience (obtained by standardized exit interviews).

Results:

Of the evaluable patients, 80% (n=8/10) met the primary efficacy endpoint (Dean's scale 0-2) with 20% (n=2/10) trial failures due to pre-mature discontinuation. Manual cold-capping was worthwhile to 90% of patients (Was it Worth It? Questionnaire) and associated with favorable PROs. Patient interviews identified a number of themes shared by almost all patients, which were subsequently used to develop a questionnaire to aid patient-directed decision-making on whether to pursue manual cold-capping.

Conclusion:

This study affirms the safety and efficacy of manual cold-capping to reduce alopecia and demonstrates the importance of proper training and education to maximize efficacy. It also highlights the considerable costs and effort associated with cold-capping. Selected patients with early stage breast cancer may benefit subjectively from cold capping while the proposed clinical instrument can be used to facilitate an informed discussion between patient and provider.

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56. ***Implementing a simplified targeted feedback method to reduce fluoroquinolone prescriptions in emergency departments***

Minh Le, PharmD, Alyssa Christensen, PharmD, BCIDP, Brent Footer, PharmD, BCPS

Background: The CDC has proclaimed antibiotic resistance to be one of the biggest public health challenges of our time. Although fluoroquinolones (FQs) are among the most widely prescribed antibiotics in the ambulatory setting, there have been recent efforts to reduce their usage due to mounting concerns regarding their safety profile and resistance patterns. Provider audit-and-feedback has been shown to be among the most effective antimicrobial stewardship interventions, but the auditing process requires significant healthcare resources, is time consuming, and must be continuous in order to have sustained durability. The purpose of this study is to determine if targeted provider feedback and education material can reduce FQ prescriptions independent of prospective auditing and feedback.

Methods: This is an ongoing, multicenter, quasi experimental study across all emergency departments of a large healthcare system within the Oregon region. The primary objective is to decrease overall FQ prescriptions. Secondary objectives include reduction of FQ prescriptions by individual prescriber and study site. Pre-intervention antibiotic data was gathered between October and December 2019. Aggregate FQ prescription data was extrapolated by individual prescriber and study site and distributed in January. Education material containing the latest guideline recommendations and relevant practice pearls was also provided. Post-intervention data was then gathered between February and March 15. This study has been approved and given exempt status by the institutional review board.

Results: There was a total decrease in both FQ and all antibiotic prescriptions in the post-intervention period. Total encounters in which a FQ was prescribed was significantly lower in the post-intervention period with a difference of 2 (95% CI 1.6 to 2.3; $p < 0.0001$). Using a McNemar test to account for low FQ prescription volumes, wherein monthly FQs were counted in binary units (0 or > 1 FQ prescriptions) for each provider, there was a statistically significant reduction in FQ rates from 140 providers (78.2%) in the pre-intervention period to 66 (39.3%) in the post-intervention period (p -value=0.0084). There was not enough data to perform statistics on FQ rates per provider or between study sites.

Conclusion: Targeted provider feedback led to an overall decrease in FQ prescriptions. Although the preliminary results are encouraging, more data is needed to detect the true impact of the intervention and analyze trends.

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57. *Addressing The Social Determinants of Health in the Clinic Setting*

Larissa Sharma, MD, Man Tran, MD

INTRODUCTION: It is estimated that clinical care accounts for only 20% of health, while behaviors, physical environment, and social and economic factors determine the rest. The social determinants of health include the basic life needs of housing, food, transport, along with other factors that include employment, education, drug and alcohol use, dental and eye care, etc. Insecurity in these socioeconomic factors are expressed in chronic medical illness, mental health problems, substance use, all leading to high healthcare utilization. Healthcare costs and utilization decrease when these needs are provided for. In a survey of 6,000 Providence patients, 50% expressed a social determinant need. Providence subsidizes Community Resource Desks around Oregon, staffed with bilingual resource specialists from local social service organizations, designed to connect individuals in need of support with resources available in their community. A model for referral to a local Community Resource Desk was created and patients referred to the desk to provide for any social needs.

OUTCOMES: More than 250 of our Providence St Vincent Resident Clinic patients were referred and offered resources in the 1st year of the project. At peak screening 30-40 patients were referred monthly. Most of these patients would not have otherwise come to our attention. Most common resources provided: dental care, housing/rent, utilities, food, transport, employment assistance, health insurance, English/computer classes. We are better able to care for our most vulnerable patients including non-English speakers, uninsured, and Medicaid/Medicare patients. Clinic staff and providers expressed satisfaction with the simplicity of the process.

DISCUSSION: • This system allows for more comprehensive care, streamlines workflow for providers, and allows providers to practice in a way more in line with their goals. In addition, multiple studies show cost savings benefits to implementing similar programs. • One study with a similar intervention noted 10% yearly health care cost reduction for those who had their social needs met. • Vermont Health system- implemented multidisciplinary team care model adding Community Health Specialist. Found tremendous cost benefits and decrease in hospital admission rates (declined 21%) and ED utilization (declined 31%). Per person per month costs fell 36%. • We are in the process of collecting data on how this is impacting our quality metrics including healthcare utilization, hospitalization rates and per patient/per month costs.

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58. Battling the Stigma: HIV Screen in Resident Primary Clinic

Garrett Spencer, MD, Laura Loetscher, MD, Shelley Sanders, MD

INTRODUCTION: HIV affects ~1.2 million in the US, with 25% unaware of their status and annual incidence of 50,000. Early detection and treatment reduces risk of AIDS-related deaths and transmission. Both the CDC and the US Preventative Service Task Force recommend routine HIV screening. The Providence Medical Group at St Vincent (PMG-STV) resident clinic has no routine screening protocol. • 24% (757/3139) of all clinic patients have ever been screened. • Of active clinic patients seen quarterly, 5% are offered screening with only 3% completing screening. We implemented and measured a clinic-wide HIV screening protocol leveraging existing clinic workflows. We aimed to increase screening of active clinic patients from 3% to 25% at one year.

METHODS: Using a time-series design we measured quarterly rates of HIV screening tests ordered and resulted in active clinic patients, ages 18-65 and seen in office, during the study period. We utilized a pre-existing preventative healthcare workflow for routine cancer screening, influenza vaccines, etc. We introduced this workflow to residents and staff prior to our go-live date.

RESULTS / DISCUSSION: Our primary outcome was to increase quarterly HIV screening rate of active patients, with a secondary outcome to increase overall clinic HIV screening rate. We increased the quarterly screening rate of active patients from 3.34% to 9.19%

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59. Delirium: Delirious Elders, Implementing Reduction Interventions Using Mobility

Michael Silvas, MD, Joe Miller, MD, Shelley Sanders, MD

INTRODUCTION: This quality improvement project involved hiring, training, and managing 3 Delirium Mobility Aids to implement a non-pharmacologic delirium prevention bundle package, including early mobility, on hospitalized patients age >65.

Background: Delirium affects 20-30% of older hospitalized patients [1]. Patients with delirium have double the mortality rate [3], which increases with delirium duration [4]. Delirium worsens long term cognitive functioning [9,10,11,12]. Hospital costs increase by \$2,500 per patient, totaling \$6,900,000,000 in Medicare expenditures [7]. A single delirium episode increases total yearly costs by ~\$64,421 [2]. Research suggests the best treatment is non-pharmacologic multicomponent interventions [6], and those with most benefit include early mobility, reorientation, cognitive/sensory stimulation, and hydration [5].

Methods: A delirium prevention protocol was created addressing four main pillars. • Hydration: water placed within patient reach. • Sensory input: • window blinds opened by 9:00 am • hearing-aids and eye-glasses retrieved and utilized. • Soothing music via delirium TV channel for non-communicative patients. • Reorientation: oriented to person/place/time 3 times daily. • Mobility: 20-min walk (mobilization event) 3 times daily Work and time constraints prohibited existing health professionals (CNA, RN, MD, PT, OT) from implementing the protocol. Thus a new job position (Delirium Mobility Aid) was created to implement this protocol for all patients age >65 admitted to Medical A(28-bed medical unit). This was proposed to Providence St. Vincent Medical Foundation who awarded a \$170,000 institutional grant for 12 months. The project residents reviewed applications, interviewed, and hired 3 CNA's to fill the position 12 hr/day, 7 days/week. Physical and Occupational Therapy trained the aids for 3 weeks in delirium management and mobilization techniques. Data was collected in Epic flowsheets and chart notes. Confusion-Assessment-Method (CAM) is an established delirium scoring system utilized on Medical A. Data from intervention year (2019) was compared to baseline data collected 2 years prior (2017, 2018) on the same hospital unit.

Results: Preliminary data collected at month 9 of 12: • No statistically significant change in total delirium burden. However there is a trend toward decreased delirium in prolonged hospitalization (measured after day 4). For these patients with LOS > 6 days, there was a 4% reduction in late-stay delirium compared to 2018 and 10% from 2017. • 7.5-13% more patients were completely delirium free after day 4 • Length of Stay (LOS): no significant change (5.5 days) • Patients admitted from home experienced a 4% increase in discharge to home (rather than care-facility) approaching near significance (p-value 0.06). • There was a trend toward reduction in hospital falls: 2017-33. 2018-29. 2019 (present)-19, projected to reach 25 by year's end. • Press-Ganey patient satisfaction scores remained stable.

Conclusion: Non-pharmacologic multicomponent prevention protocols, which include mobilization, implemented by specialized CNA's, are a potentially viable treatment of delirium in elderly patients with prolonged hospitalization. This may increase rate of discharge to home, without worsening falls, LOS, or patient experience, and has a cost-savings benefit.

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60. *Impact of academic detailing on clinical pharmacy specialist involvement in medication assisted treatment for opioid use disorder in a primary care setting*

Lindsey Bartos, PharmD; Kristin Tallman, PharmD, BCPS, BCACP;
Dara Johnson, PharmD, BCPP, BCACP

Introduction: Opioid prescribing and opioid overdose deaths have increased steadily since the 1990s, reaching a 6-fold increase between 1999 and 2017. The opioid crisis, as it became known, was declared a public health emergency in 2017. In 2018 alone, an estimated two million people had a diagnosed opioid use disorder (OUD). The use of medication-assisted treatment (MAT) for OUD reduces the use and cravings of opiates, and risk of all-cause and opioid-related mortality. The inclusion of clinical pharmacy specialists (CPSs) on multidisciplinary healthcare teams has been shown to improve health outcomes, increase cost-effectiveness, and improve the quality of healthcare. Nevertheless, CPS involvement in MAT for OUD in a primary care setting remains limited. This study will provide information regarding barriers to CPS involvement in MAT, and the effectiveness of academic detailing provided to CPSs in increasing CPS involvement.

Objectives: The objectives of this project are to identify and describe the most common barriers to CPS involvement in MAT for OUD, then assess the impact of academic detailing on CPS comfort level with being involved in the care of patients undergoing MAT for OUD in the primary care setting. Additionally, this project will assess the hypothesis that academic detailing will increase the number of patients with a CPS involved in the treatment of OUD.

Methods: Study participants are CPSs recruited from a large medical group in Oregon and SW Washington who completed a survey before and after participating in academic detailing. The presurvey was used to assess demographics, current involvement with MAT, perceived barriers to involvement in MAT, and asked participants to anonymously assess their comfort level, knowledge, and beliefs regarding MAT for OUD using a 0-5 point scale. Academic detailing was developed based on reported barriers, and consisted of handouts, two 45 minute interactive presentations, and small group work with case-based application. Participants then filled out a post-survey to re-assess their comfort level, knowledge, and beliefs regarding MAT for OUD following academic detailing. Survey results were compared and summarized by using either % of respondents in each category or mean (standard deviation) for each question across all respondents, then compared using a Wilcoxon-rank-sum test. CPS involvement in MAT will be reassessed using a survey or electronic intervention tracking in June.

Results: 19 CPSs responded to the pre-survey and 20 CPSs responded to the post-survey. 4 respondents (21.05%) were currently active in MAT, and of these respondents, 3 indicated they are involved with MAT for 1-5 patients annually, and 1 indicated they are involved with MAT for 20+ patients annually. The most common barriers to involvement in MAT were lack of time (23.08%), lack of X-waivered providers (23.08%), and lack of knowledge regarding MAT (21.15%). There was no change in the number of CPSs involved in MAT between the pre-survey and the post-survey. Median responses to 6 of the 8 survey questions differed significantly between the pre and post surveys ($p < 0.05$), while the remaining 2 demonstrated improvement that was not statistically significant.

Conclusions: Most CPSs within PMG are not involved in the use of buprenorphine in MAT for OUD, likely due to a combination of time constraints, a lack of providers with the ability to prescribe buprenorphine, and unfamiliarity with buprenorphine in MAT. Following academic detailing to address these barriers, CPS comfort with buprenorphine in MAT had significantly improved in most areas. CPS involvement in MAT for OUD will be reassessed in June, 3 months following the academic detailing intervention.

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61. Increasing Vaccination Rates of children up to 24 months old at PMG Milwaukie Family Medicine

Justin Ferley DO; Rachel Jackson MD; Aubrey Miller MD; Sebastian Reeve MD; Christelle Serra Van-Brunt DO; Jamie Skreen DO; Jeffrey Sun DO; John Yates MD; Daniel Ruegg MD

Introduction: Each year in the US, 42000 adults and 300 children die of vaccine preventable diseases. Yet across the country, clinics – including ours – fall short of the CDC Healthy People 2020 goals of pediatric vaccination rates. This resident-led quality improvement (QI) project aimed to improve our clinic vaccination rates in the under 24mo population.

Methods: We identified 3 opportunities for vaccinating children under our clinic current processes: well child visits, medical assistants' vaccinations visits, and acute care visits. Using a multidisciplinary approach comprising residents, MAs, clinical care coordinators and our nursing quality supervisor, we analyzed our current vaccinations processes and our iterative plan-do-study- cycles (PDSA) included: PDSA #1: standardize our work flow for vaccine reconciliation. PDSA #2: sending personal reminder letters to patients and overall improving our vaccine recall/ reminder system. PDSA #3: Minimizing provider variation for vaccines given at the 12-18mo WCC.

Results: We saw an improvement in our vaccinations rates after personalized reminder letters were sent out, outlining that we do not have a reliable vaccine schedule reminder system. We also noted that different providers created different vaccinations schedules in order to prevent giving 5 vaccines at the same time – with no system in place to follow on missed vaccination, thus creating missed opportunities and suggesting that we need to implement a clinic-wide vaccine schedule.

Conclusion: Our last PDSA cycle was interrupted by current COVID-19 pandemic. We have however found valuable data to help improve our clinic's vaccination rates, and plan to continue this project over the next 2 years.

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62. Evaluation of Transitional Care Interventions from a Decentralized Clinical Pharmacist in a Small Inpatient Geriatric Psychiatry Unit

Nathan Wong, PharmD; Michael Brown, RPh, BCPS, BCPP

Background:

Transitioning between healthcare settings increases the risk for medication errors. A systematic review of 26 studies comparing various medication reconciliation interventions demonstrated consistent reductions in adverse drug events. Intensive pharmacist involvement and focus on high risk populations were the most successful.¹ Geriatric and behavioral health populations are especially vulnerable with polypharmacy and cognitive impairment often complicating the picture. Providence Milwaukie Hospital (PMH) houses a small unit tailored to provide mental health care for seniors. A certified psychiatric pharmacist is nested within the team and plays a critical role in transitional care by reconciling medications upon admission and discharge. This study quantifies these interventions with the purpose of both establishing a baseline and identifying potential areas for future quality improvement projects.

Methods:

This is a single center retrospective chart review of all patients discharged from the Providence Milwaukie Hospital Senior Psychiatric Unit from January 1st, 2019 to January 1st, 2020. The unit contains 19 private rooms for patients typically 65 years and older. Short term psychiatric care is provided by a diverse set of mental health professionals. The primary outcome evaluates in-unit changes made upon pharmacist reconciliation of admission and discharge medication lists. The secondary outcome evaluates the occurrence of pharmacist medication counseling upon discharge. Patients with no existing prior to admission medication list or whose list was recently reconciled by a pharmacist prior to admission were excluded. This study has been approved by the Institutional Review Board.

Results:

A total of 254 discharges occurred from January 1st, 2019 to January 1st, 2020. Baseline characteristics included an average age of 75 years with a higher proportion of females at 66.1%. The average length of stay was 25 days and the most frequent discharge disposition was to home or self-care. Admission medication lists were reconciled either by a PMH pharmacist or an external pharmacist within 14 days of admission in 239 (94.1%) discharges. Inclusion criteria was met in 109 (42.9%) discharges. In unit pharmacist medication reconciliation on admission totaled to 97 (89.0%). On admission, at least one discrepancy was identified upon 70 (72.2%) reconciliations. A pharmacist on average added 2.8 drugs, removed 1.7 drugs, and modified 1.2 drugs per reconciliation. Of the drugs that were modified, dosing and frequency changes were the most common. Each admission reconciliation included on average an addition, removal, or modification of 1.5 behavioral health medications. Upon discharge, reconciliation was documented in 74 (67.9%) cases and education was documented in 10 (9.2%). Implementing a proactive education and reconciliation workflow upon discharge was recognized as an area where pharmacists may improve the effectiveness of transitions of care.

Conclusions:

Pharmacists are heavily involved in the transitions of care process for the Providence Milwaukie Hospital Senior Psychiatric Unit. An embedded clinical pharmacist is making impactful changes to patients' medication lists upon admission which often involve a behavioral health drug. Ensuring accurate medication lists enables providers to make informed decisions and reduces adverse events.

1. Mueller SK, Sponsler KC, Kripalani S, et al. Hospital-based medication reconciliation practices: a systematic review. *Arch Intern Med*. 2012 Jul 23;172(14):1057-69. doi: 10.1001/archinternmed.2012.2246.

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63. Evaluating the utility of CYP2C19 genetic testing for P2Y12 inhibitor prescribing within an inpatient setting

Thomas Maslo, PharmD,Carolynn Null, PharmD

The emergence of pharmacogenomics offers the opportunity to practice precision medicine across health care. In patients presenting with acute coronary syndrome (ACS) and undergoing percutaneous coronary intervention (PCI), dual antiplatelet therapy (DAPT) is routinely prescribed for 12 months. DAPT consists of a P2Y12 inhibitor (clopidogrel, ticagrelor, or prasugrel) plus aspirin. Of the P2Y12 inhibitors, clopidogrel is uniquely impacted by CYP2C19 status. About 30% of the North American population carry at least one CYP2C19 allele associated with reduced metabolism. Ticagrelor and prasugrel are not impacted by CYP2C19 metabolism, but are associated with increased bleeding and cost. Current guidelines favor the use of the latter, with routine genetic testing not recommended. Recent studies have provided positive evidence that a genotype-guided approach results in improved outcomes. This study aims to identify how CYP2C19 genetic testing may impact prescribing practices. This is an IRB-approved, retrospective cohort analysis of P2Y12 inhibitor prescribing and outcomes following PCI. Chart review within the electronic health record was completed from September 2016 to September 2019 among patients presenting to two large, tertiary medical centers. Patients included those >18 years old, with an index diagnosis of ACS. Patients were excluded if they had a history of cancer, pregnancy, or if they did not have a documented encounter after 30 days following PCI. The primary outcome was the incidence of optimal P2Y12 inhibitor prescribing. Secondary outcomes included major adverse cardiovascular events (MACE) and stent thrombosis at 30 days and 1 year. A cost analysis was also completed utilizing a simulated genotype-guided strategy. A total of 401 patients were included within the primary analysis, with clopidogrel and ticagrelor being prescribed at rates of 73.1% and 26.1%, respectively. Prasugrel was prescribed at a rate of 0.8%. There was no difference among prescribing for an index diagnosis of NSTEMI vs. unstable angina ($p=0.71$). However, prescribing was different for NSTEMI vs. STEMI ($p=0.00$) and unstable angina vs. STEMI ($p=0.00$). Patients prescribed clopidogrel were readmitted for MACE or other ischemic events significantly more than those prescribed ticagrelor ($p=0.01$). Additionally, event rates were increased within the initial 30 days. In a cost-analysis with a simulated genotype-guided strategy, reduced readmission rates resulted in total cost-savings of \$527,377, or \$1,325 per person. This study shows that overall P2Y12 inhibitor prescribing rates compare favorably to the expected population distribution of CYP2C19 alleles. However, individuals with loss of function alleles are potentially being prescribed clopidogrel at discharge, thus increasing their risk for adverse outcomes. As these event rates are more pronounced within the initial 30 days, initiating CYP2C19 screening in the inpatient setting may help minimize early readmissions. Additionally, a genotype-guided approach may result in cost-savings over 1 year.

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64. ***Impact of clinical pharmacist medication review upon enrollment in a Program of All-Inclusive Care for the Elderly (PACE)***

Adam Olesen, PharmD, PGY1 Resident, Kristen Wendell, PharmD, BCGP
Providence Elderplace Oregon

Learning Objective:

Describe the interventions and recommendations made by a pharmacist upon enrollment of a new participant at a PACE facility.

Abstract:

Pharmacists have been proven to be beneficial in the transitions of care for high-risk patients with multiple morbidities, such as the reduction of both polypharmacy and thirty-day readmission rates. The objective of this study is to quantify and characterize the total number and type of interventions and recommendations made by pharmacists over a three-month span when new participants enroll with Providence ElderPlace, a Program of All-Inclusive Care for the Elderly (PACE). Clinical pharmacists at Providence Elderplace were trained on how to document their interventions and recommendations within the EPIC electronic medical record using the I-vent documentation system. The pharmacists documented interventions made at the time of enrollment and recommendations for follow-up after enrollment for all participants who were enrolled between Nov 1, 2019 and Jan 31, 2020. The primary investigator gathered this data via the I-vent reporting system within EPIC. Pharmacists also documented whether each recommendation pertained to a Beers List medication and whether the recommendation is made with the primary goal of reducing polypharmacy. The primary investigator followed recommendations that were not implemented at enrollment for two months to assess whether they were implemented by the provider. Data was analyzed to quantify the impact of these recommendations and interventions that the clinical pharmacists had made. The primary endpoint was a composite analysis of the number and type of interventions completed upon enrollment. Secondary endpoints included the percentage of recommendations presented by pharmacists that are implemented at enrollment and within two months following enrollment, whether the intervention pertains to a medication on the 2019 Beers List, and the number of recommendations of which the primary goal was to reduce polypharmacy (defined as unused medications on an enrollee's medication profile). Results will be presented. This study approved by the Institutional Review Board.

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65. Implementation and evaluation of pulmonary arterial hypertension clinical program and pharmacist education at a health-system specialty pharmacy

Timothy Cao, PharmD, PGY-1 Pharmacy Resident, Adam Saulles, PharmD, CSP, BCACP and Tara Berkson, PharmD, BCACP

Pulmonary Arterial Hypertension (PAH) is a progressive, debilitating, and costly disease, often resulting in poor prognosis when treatment is inadequate. With an exponential growth of specialty therapies, clinical pharmacists in specialty pharmacies are well-equipped to play an integral role in improving patient care outcomes and reducing overall healthcare costs. By incorporating a PAH-specific clinical program as part of the specialty pharmacy workflow, clinical pharmacists can provide meaningful interventions, such as evaluation of disease-modifying medications through individualized assessment of disease state symptoms, reconciliation of medications to assess for drug interactions, and laboratory parameter, compliance with Risk Evaluation & Mitigation Strategies (REMS) programs, while dispensing medications in a safe and cost-effective manner. The purpose of this study was to develop and implement a PAH-specific clinical assessments and workflow, while providing enhanced pharmacist education, training & resources in a health-system specialty pharmacy setting.

This was a single-centered, quasi-experimental and implementation study with retrospective review at a health system specialty pharmacy. The primary objective of this study centered on building PAH-specific “new patient” and “patient follow-up” assessments and providing specialty pharmacists enhanced PAH and REMS education and training. The effectiveness of pharmacist education was evaluated based on pre-and- post clinical assessments during two targeted training sessions before the launch of the new workflow, along with a final clinical assessment one-month post-workflow launch. The secondary objective of this study focused on the quality of patient intervention during the implementation phase and pharmacist satisfaction with PAH/REMS-focused education. A retrospective report was run from the specialty pharmacy electronic health record (EHR) from February 2nd, 2020 to April 17th, 2020 for all completed PAH assessments and pharmacist interventions. Primary objective results found upward trend in pharmacist competency and readiness following two PAH/REMS education sessions. Clinical assessments during pre-implementation phase found average pre-test results of 43.5% and post-test results of 74%, indicating 70% increase in pharmacist competency. High level of proficiency was sustained one-month post-implementation phase with mean competency at 85% and above. Pharmacist readiness in PAH management increased by 67% overall. Secondary objectives found majority of pharmacists were satisfied with the PAH education, implementation process and resources provided. EHR retrospective review identified several meaningful pharmacist interventions, notably drug utilization and interaction reviews, lab parameter assessments, side effect management and medication educations. High cost, complex medication regimens were dispensed according to REMS criteria and delivered to patients safely within an average of 3.5 days to ensure patient continuation of therapy.

PAH clinical program implementation and targeted- education successfully enhanced pharmacists' clinical knowledge, readiness, and meaningful intervention for PAH population in a health-system specialty pharmacy.

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66. *Impact of pharmacist-led appointments for hypertension management in a primary care setting: a retrospective analysis*

Anne Marie Thibodeaux, PharmD, MPH, Christing Doran, PharmD, MBA, BCACP
Ben Rosait, PharmD, BCACP

Introduction:

High blood pressure is a major risk factor for heart disease and stroke, two of the leading causes of death for Americans.¹ Evidence supports the idea that pharmacist-led hypertension management can result in overall blood pressure reduction; however, it remains unclear whether pharmacist-led initiatives can also improve performance metrics.²⁻⁵

Research question:

Can pharmacist-led appointments for blood pressure management positively impact hypertension metrics?

Study design:

Retrospective chart review

Methods:

Primary outcome data was measured via metric inventory, defined as percentage of patients who had reached their blood pressure goal. Two time points were compared at two primary care clinics (1 month before the pharmacist-led HTN appointments were established compared to 4 months after) to determine a potential change in percentage of patients achieving BP goal. Secondary outcome data was obtained via chart review for patients whose hypertension was managed by the pharmacist (n=50) and matched patients managed by their primary care physician (n=50).

Results:

Overall, the metric for Clinic A decreased from 74.7% to 73.5%, and Clinic B decreased from 72.2% to 65.5%, illustrating less patients had achieved their blood pressure goal. However, a change in the metric definition occurred in the middle of the study period, which may explain the percentage decrease. Examining pharmacist visits, only 38% of patients were at their goal blood pressure initially, but 80% of patients were at their BP goal during their final visit. Pharmacists had an average of 2.2 medication interventions per patient per visit.

Conclusions:

The overall change in the metric does not suggest pharmacist-led appointments for hypertension management can positively impact the metric; however, changes in the metric definition interfered with proper assessment. Overall, pharmacists were able to optimize medication regimens, and almost half of the patients who were not at goal initially were able to achieve it within 4 months.

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